

ELECTRONICS & TECHNOLOGY TODAY!

Canada's Magazine for High-Tech Discovery

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Special Feature

Electronics Education

Project

Build an OP-AMP
Power Supply

History

Einstein and the
Great Household Refrigerator



513735*APR 92* ET27* *
KEVIN JOURNEAUX
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Inside:
Special Feature on Monitors
Plus:
Laptops, Portables & Notebooks

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November/December, 1991

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Feature

Choosing An Electronics School

by Chuck Ander, research by Susan Charnes

It's not too hard to choose an appropriate course of education today—when you know what you want and you know what's not done for you. Regrettably, *blindsight* can offer some useful pointers.

Levels of Study

[illegible]

At present, *Blattodea* General does not exist. Instead, Orange Grove College offers Ordinate classes in "Ants & Other Synonym Termites" (all wanted) and "Other Synonym" (all wanted).

Electronics & Technology Tests

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Feature

Basic Electronics #6

by Ron C. Johnson

Murphy's Law states that whatever can go wrong, will, and so the most inevitable of all accidents must befall the most confident. There are many variations on this theme, but the most popular is: Murphy's Law never leaves a man alone. On the other hand, nothing does help a man go right, but it is a sound theory.

Last summer I told you we would do the ultimate test of Murphy's Law: to take you *inside* the world of the theory on

way. We are still going to build a pumpjet using an engine land a few other components but we'll also build a prime of equipment for your benefit that you'll need to know for the rest of your life. With an engine — a single engine power supply with cooling and fuel — we can create a variable voltage regulator. In addition, I'll tell you how to build a lightning rod and really go inside a lightning

While some graduates of handwired circuits end up using an engine as an internal engine power supply, my belief is that it is better to grow up with a dual engine. I would like to see a negative voltage regulator, not that changing the sign of voltage makes sense, but changing the sign makes sense. And so my theory is that you can use a dual engine to create a variable voltage regulator. In addition, I'll tell you how to build a lightning rod and really go inside a lightning

First, a background on why you need a power supply like this one.

	<p> NAME _____ ADDRESS _____ CITY _____ STATE _____ ZIP _____ </p>
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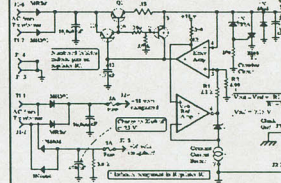


Figure 1. Schematic of Surplus Power Supply

Electronics & Technology Test

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History

Einstein and the Great Household Refrigerator

by George Colpitts

September 1978, a New York Times headline announced that Florida inmates at the United States Penitentiary in Miami had been "rehabilitated." The headline was based on a survey of 100 inmates, 50 of whom had been released from the prison and 50 who had not. The survey was conducted by a team of 100 inmates, 50 of whom had been released from the prison and 50 who had not. The survey was conducted by a team of 100 inmates, 50 of whom had been released from the prison and 50 who had not. The survey was conducted by a team of 100 inmates, 50 of whom had been released from the prison and 50 who had not.

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THE

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WORKING LATE



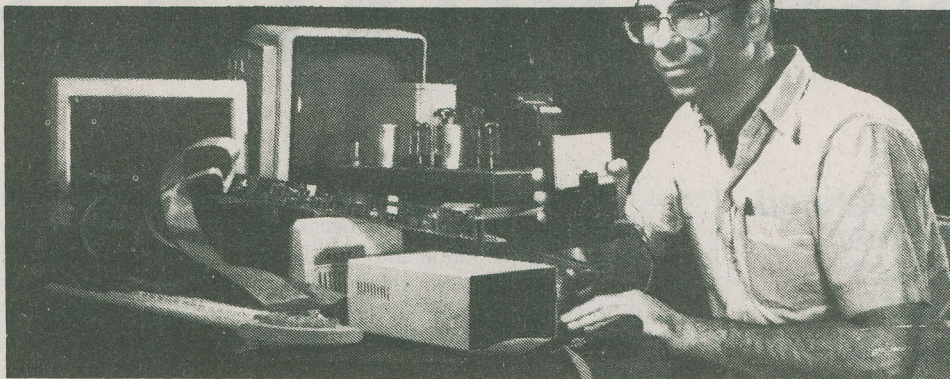
"Well, that's done. Feel like stopping off for a drink when we leave?"

"Thanks, but I'll save it for home. I'm driving tonight."

Seagram

P.O. Box 847, Station H, Montreal, Quebec, H3G 2M8

Editorial



Well, the year is almost gone and the Holiday Season is almost upon us. I'd like to take this opportunity to wish a very happy and healthy Holiday Season to all *Electronics & Technology Today* readers.

This month we are featuring electronics education. I think (and I hope you agree) that education is extremely important — not just for young people, but for everyone. Life is about learning new things and constantly trying to advance our horizons. It's one of the things that makes us human. It also makes life a great deal of fun.

You will notice that this magazine contains a guide to the Canadian Computer Show. The show,

however has come and gone. The reason we are including the show guide in this publication is to give our readers contacts, addresses and phone numbers of companies who participated in the Canadian Computer Show. Hopefully, this will be of value.

So have a great holiday, and why not register for a new course of study at your local college. Let's improve our life, have lots of fun, and become better people in the process.

Good luck and happy learning.

Chuck Ander

Chuck Ander
Editor

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New Products

New Courses Featured in Fluke Customer Training Services Course Planner

Mississauga, ONT, November 1, 1991 — The new 1991-1992 Fluke Customer Training Services Course Planner, featuring new courses on Spectrum, TestCase, Board Test Programming and Troubleshooting, and Calibration Laboratory Management, is now avail-

able from Fluke Electronics Canada Inc. Fluke is a leading supplier of electronic instrumentation and services designed to provide test solutions to technical users involved in research, manufacturing, service, design and calibration.

The courses are provided because Fluke believes that the more the customer knows about Fluke equipment, the higher the customer's productivity. They offer hands-on experience and

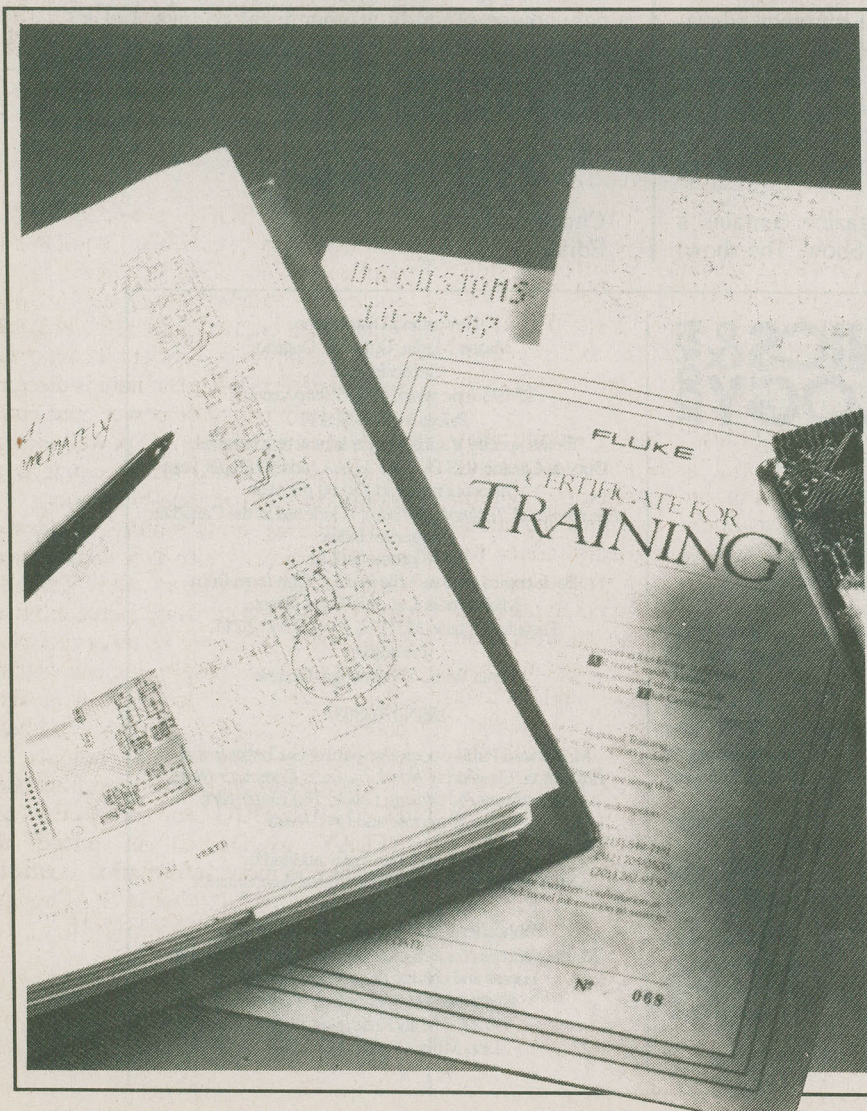
comprehensive lectures with highly-trained professionals.

The 1991-1992 Fluke Customer Training Services Course Planner is available from Fluke Electronics Canada Inc., 400 Britannia Rd. E., Unit 1, Mississauga, Ontario, L4Z 1X9 or call (416) 890-7600.

IDI DSP Board is Both Inexpensive and Expandable

The INNOVATIVE DEVICES, Inc. DSP-11B is based on Analog Devices, Inc. ADSP-2111 3rd generation Digital Signal Processor. The ADSP-2111 is capable of sustained 13 MIPS operation and all instructions execute in a single 77ns cycle. The three computational units (ALU, MAC and SHIFTER) as well as onboard timers, multiple interrupts, and generous amounts of data and program RAM can operate at a low 300 mW power level, with 80mW standby. The DSP-11B is targeted for embedded applications and may be used as a stand-alone processor card or as a co-processor for a variety of host systems. The system has 80 K bytes of zero wait state memory, 4 analog input channels, 2 analog output channels, an RS-232/485 port and a System 52 ('NOBUS') port for interface to Innovative Device's line of microcontrollers and peripherals. All of IDI's System 52 and DSP boards have 3" x 5" x 1/2" form factors.

The two dual channel A to D converters and two D to A converters have 14 bit resolution with software programmable conversion and sample rates to a maximum of 24,000 conversions per second. The low pass (also configurable as bandpass) anti-alias filters and low pass output-reconstruction filters have independent software programmable roll-off points. The A to D front end has 3 programmable gains and operates in either single ended or



differential mode. The output section includes a selectable (sinX)/X correction filter, and either single ended or differential outputs.

Four different host options allow the DSP-11B to be used as both a development platform and a production solution for computationally intensive applications: the DSP-11B can perform as a stand-alone product, boot-loading from the on-board EPROM; a Host may control the DSP-11B via the serial port at up to 500 KBaud (RS-485); the System 52 'NOBUS' provides parallel bus access at burst rates of 300 K-Bytes/second; and up to 8 DSP-11B's may be paralleled on a System 52 bus, utilizing an MC-52R as the host controller. The System 52 'NOBUS' port allows the DSP-11B to expand using inexpensive, off-the-shelf digital and analog subsystems, enclosures, character and graphic LCDs and keyboards.

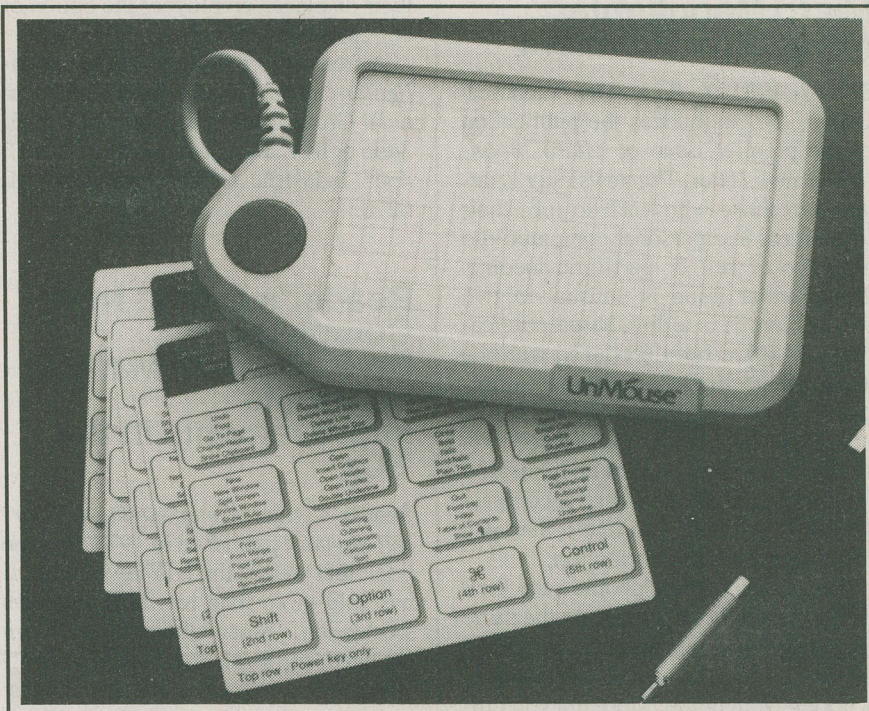
The DSP-11B is an inexpensive system designed to ease the design path toward Digital Signal Processing. It comes with example software and an operating manual. A very low cost, entry level assembler is also available from IDI.

For more information contact: Innovative Devices Inc., 1119 Damelart Way, Brentwood Bay, B.C. V0S 1A0 (604) 652-5240.

The Innovative Mouse Alternative

Manufactured by MicroTouch Systems, Inc. the UnMouse is the fastest pointing device around. You move the cursor effortlessly, just slide your finger over the glass then press to click. It comes with special templates, each offering up to 60 programmable function keys. In Absolute mode, with one million touch points mapped precisely to the screen, you point to a location on the tablet and instantly the cursor appears in the relative place on the screen.

The UnMouse combines cursor control with powerful function keys. The programmable keypad allows you to simply press down on a key to execute a command, macro or any combination of keystrokes. Well labelled templates for popular programs are included, along with utility software for customizing your own templates — design-



nate up to 60 keys on each blank template.

The UnMouse is stationary and compact. The outside dimensions are 6.5 X 4" with an active area of 4.5 X 3". Using your finger or the stylus provided, the UnMouse becomes a creative mini-graphics tablet. Draw, trace, doodle or even sign your name. Its 1,000 by 1,000 touch points provide the precision necessary for even the most demanding CAD applications.

The UnMouse is the ergonomic alternative to a traditional mouse. Repetitive Strain Injuries are common for big time mouse operators and this ingenious pointing device can greatly reduce the chances of acquiring and ease the symptoms of Carpal Tunnel Syndrome, Ganglion Cysts, Tenosynovitis and other related injuries. Contact Innovative Devices' Engineering staff for data from our in-house ongoing evaluation.

Models are available for both the Macintosh Computers and IBM compatibles (RS-232 interface. 100% Microsoft Mouse compatible). Innovative Devices, Inc. distributes this product in Canada for \$229. Call for more information 604-652-5240.

Prevent Theft of PC's, "Bug" The AC Power Outlets

The THIEFBUG protects PC's, monitors, printers, office equipment, copiers, TVs, VCRs, and other electronic items from theft or unauthorized removal. It is installed in the electrical outlet box, where it cannot be seen. It detects when the item is disconnected (unplugged or power cord cut), and uses the existing AC power wiring to transmit a coded alarm signal to a monitoring unit at another location.

Monitoring units require no wiring and plug directly into 115 VAC power outlets, and monitor as many THIEFBUGS as needed. They range from a single plug-in buzzer or relay module, to wall-mounted monitoring panels that identify up to 512 locations from the coded signal, and provide audible, visual, and electrical (relay) outputs.

A complete system for protecting one PC (THIEFBUG and BUZZER or RELAY MODULE) is priced at \$83.00. For more information contact: CEPSCO, 21515 Parthenia St., Canoga Park, CA 91304 (818) 998-7315.

Micro Moonlighter Newsletter Premiers

SPRINGFIELD, IL — The Technical Group, Inc. announces the publication of the premier issue of *Micro Moonlighter* newsletter. The newsletter is targeted to those who wish to turn their investment in a personal computer into a source of full or part-time income. The premier issue is unusual in two ways. First, it is a disk-based publication which has been produced with the latest in electronic publishing techniques. Secondly, the issue of the newsletter is being distributed via shareware, a popular marketing method for computer software that encompasses the "try it — if you like it then pay for it" approach to distribution.

The way in which people earn their living is rapidly changing. At the same time that traditional industry is moving offshore, there is a massive move to working from home. More than 38 million Americans earn part or all of their livelihood from home now. One of the best businesses for the sole practitioner or the husband/wife team is the assimilation, organization, and marketing of specialized information with a personal computer as a toolbox for the enterprise. *Micro Moonlighter* newsletter is a resource publication for the Information Entrepreneur. Each issue provides regular articles and features about such areas as Information Brokering, Consulting, Desktop Publishing, Traditional Publishing Ventures, Shareware Development, and Electronic Publishing. Additionally, the newsletter provides a catalog of resource materials especially for those who wish to create an information-based business from home.

The Technical Group, Inc. provides services to telecommuters and those who work at home. In addition to the publication of *Micro Moonlighter*, it is also currently presenting its full-day seminar: "How To Create Your Own At-Home Information Business" in conjunction with Illinois Bell and its new Work-At-Home Planning Center in Chicago.

The Technical Group, Inc. also provides alternative out-placement services for companies who wish to offer

their displaced employees the option of entrepreneurship.

A free sample issue of *Micro Moonlighter* can be obtained from The Technical Group, Inc. by calling (217) 585-3456 or by mailing a request to Suite B, 4545 Industrial Drive, Springfield, IL 62703.

Reader's Digest New Complete Do-It-Yourself Manual For Home Improvements in the '90s

Reader's Digest *Complete Do-It-Yourself Manual*, published in 1973, was the book that started the DIY revolution. It has sold more than ten million copies worldwide. Since then times have changed, and so have the needs of do-it-yourselfers. Now, Reader's Digest comes to the rescue with *Reader's Digest New Complete Do-It-Yourself Manual: An All-Canadian Guide*.

The ultimate tool for do-it-yourselfers, this new 528-page manual reflects the significant evolution of the Canadian do-it-yourself industry over the past 20 years, including new tools, materials, technologies and techniques developed to accommodate the home-renovation market.

The recession has encouraged even more homeowners and apartment dwellers to become do-it-yourselfers to save money, to enhance their homes and increase their value for resale. *Environics* reports that at \$28 billion in 1990, home renovations outstripped new-home construction for the first time. This rapidly expanding market is expected to increase even further over the next few years as "baby Boomers" who've already bought their homes turn their attention to renovating them.

For more information contact: Reader's Digest, 215 Redfern Ave., Westmount, Quebec H3Z 2V9 (514) 934-0751 (*Reader's Digest New Complete Do-It-Yourself Manual: An All-Canadian Guide* is available at major Canadian book stores).

BrailleMate-A Pocket Braille Computer

MOUNTAIN VIEW, CA — New technology has made possible a pocket computer called BrailleMate for people with visual impairments. Introduced this month by TeleSensory, BrailleMate™ can be used as a note-taker, calculator, clock and calendar; it compiles names, addresses, phone numbers and communicates with other computers. BrailleMate weighs one pound and fits easily in a coat pocket.

Making lists and keeping track of notes and phone numbers has been especially difficult for blind people, requiring memorization or using a "slate and stylus" to manually emboss dots one at a time. In contrast, BrailleMate has a braille keyboard that enables rapid writing into a solid-state memory using a built-in editor. BrailleMate acknowledges what has been written into its memory with a speech synthesizer and an electronically operated braille cell. By combining both braille and speech outputs, the accuracy of braille and the speed of speech is achieved.

BrailleMate can store up to 128 braille pages in its internal user memory. In addition, credit card-sized memory cards can be slipped into the bottom of BrailleMate for extended memory.

BrailleMate is especially useful in an educational setting. For students learning braille, it serves as a teaching tool. Synthetic speech can be used to instruct the student verbally and the braille cell and braille keyboard allow drill and practice exercises. For learning academic subjects, textbook material can be stored on the memory cards and students can write notes, tests and reports into BrailleMate's internal user memory. That information can then be printed out using BrailleMate's serial or parallel port. If the material stored in the unit's memory is in Grade 2 braille, BrailleMate automatically translates it back to text for printing on an inkprint printer.

In vocational settings, BrailleMate can be used to write memos, take notes, retrieve and review files, etc. Since it is small and portable, it can be used in meetings, on trips and travels easily between work and home. Material stored

in BrailleMate's memory or on the memory cards can be printed out or transferred to another computer.

Combining BrailleMate with TeleSensory's Navigator braille display extends all of BrailleMate's handy features to a 20, 40, or 80-character refreshable braille format. With BrailleMate you have the added power of an external braille keyboard and speech synthesizer when connected to a personal computer and Navigator. And, BrailleMate will never be outdated; with "flash memory" BrailleMate's program is upgradeable by diskette.

TeleSensory has been researching, designing and manufacturing innovative products for blind and visually impaired individuals for over twenty years. We are both proud and excited to add BrailleMate to our product line that includes large print, synthetic speech, OCR, braille and tactile systems.

For more information contact the International Department at our corporate headquarters in Mountain View, CA at (415) 960-0920 or our Canadian distributor, The Betacom Group at (416) 629-1811.

Videotape Explains Newest Satellite Broadcasting Technology

Can you imagine receiving over 100 channels of television from a tiny antenna just one to two foot square? Well, that day is just around the corner.

The era of DBS, or Direct Broadcast Satellites, has already begun around the globe. High powered DBS satellites are about to burst upon the North American television scene, introducing a new communications technology that many think will be more revolutionary than the introduction of broadcast television itself.

With the high-powered DBS technology, broadcasters will now have the ability to reach every viewer in North America from a single transmitter, utilizing "dishes" so tiny as to be practically invisible and receiving equipment as simple to use as a cable TV box. There is no doubt that direct satellite broadcasting will bring sweeping changes to the television industry.

To give you an overview of the DBS scene, "The Era of Direct Broadcast Satellites" has been produced by Shelburne Films in association with Mark Long, an internationally known writer and lecturer on satellite subjects. This 56 minute videotape provides a comprehensive look at the history, technology and current state of DBS around the globe. It is fast-paced and packed with colourful graphics and visuals.

"It was designed to appeal to the widest possible viewing audience," David Shelburne, Director of the videotape, said. "We think this technology is so important that nearly everyone should have a basic awareness of it. So we tried to keep the tape very visual and interesting." The tape is intended to be an easy-to-comprehend training tool for the Broadcasting, Television, Satellite and Communications industries. Schools and colleges will find it useful also.

The viewer is given a look at the aspects of the DBS system and how it differs from other satellite technologies. The tape presents a history of satellite television, a look at initial DBS efforts in the 1980s and why they failed, a review of current DBS efforts underway, and a look at operational DBS systems now in use in Europe, Australia and Japan. Also included are segments on: basic communications principles including satellite frequencies and orbital assignments, an inside view of a satellite payload, DBS equipment, overview of the RARC DBS plan, FCC-approved high power DBS operators for the US, HDTV and video compression.

"The Era of DBS" is the 5th videotape in the Shelburne Films' Satellite Series. Two short tapes, "Satellite TV Basics" and "Satellite Magic," provide a basic introduction to satellite television; while "Installing Satellite Antennas" gives how-to-do-it instructions. "The World at 12 Gigahertz" takes a comprehensive look at Ku-band satellite technology.

"The Era of Direct Broadcast Satellites" is available directly from Shelburne Films, 54545 SR 681, Reedsville, Ohio 45772. (614) 378-6297. □

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Choosing An Electronics School: A Student's Perspective

by Chuck Ander, research by Susan Chamey

It's not too hard to choose an appropriate course of electronics study — when you know what you want and you know what's out there for you. Hopefully, this article can offer some useful pointers.

Levels of Study

Like most things in life, there are different levels of achievement and of course, levels of difficulty. You will also quite likely find that the job you can get after graduating from a higher or more difficult course of study will pay more. In other words, "ya get what ya pay for!" (more or less)

There are several levels in electronics (and other types of) education. A certificate program is generally one year in length. Often it can be completed in the evening in what many schools call continuing education. Actually, many courses, even at the highest levels may be offered after regular business hours. This, of course, depends upon the school. Most often, certificate programs offer very specialized knowledge. Some are better than others.

Many years ago I attended a course at Toronto's George Brown College entitled, "Electronics General." It was a good course, covering in 48 weeks, the basics

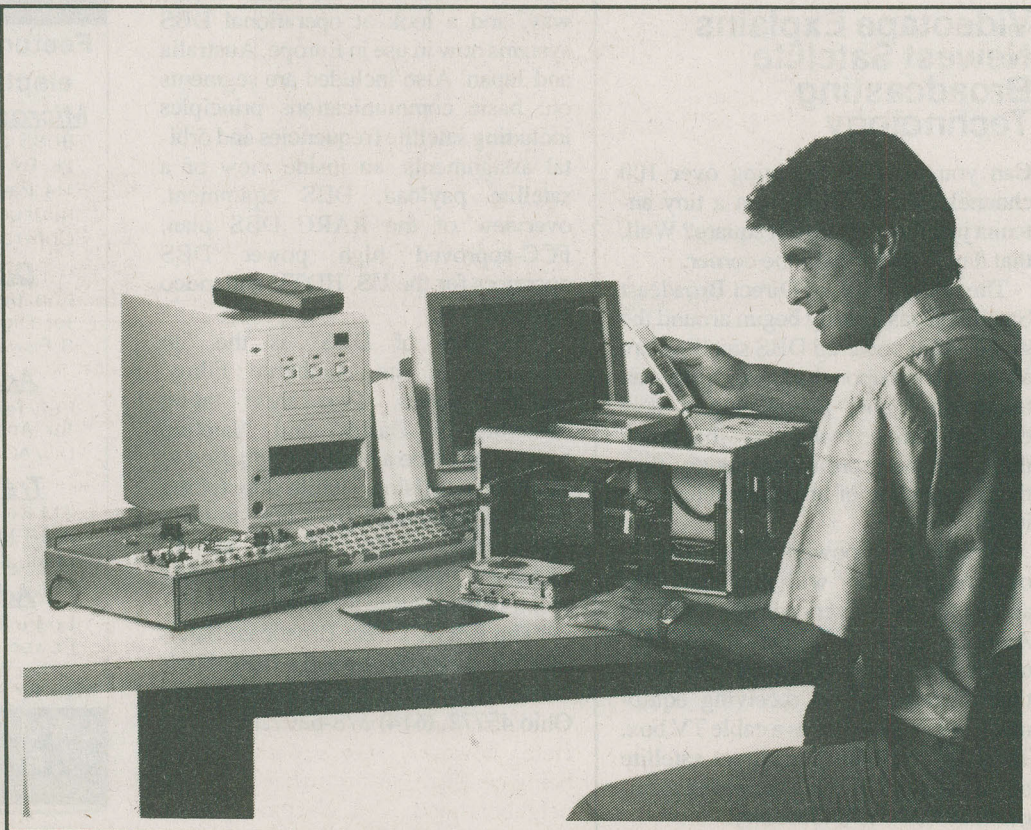
of electricity and electronics. I also took a follow-up evening course on Black & White and Colour TV. It adequately explained the theory of these devices, but both courses (Electronics General and B&W & Colour TV) failed to cover the basics and general principles of servicing — a real problem, since servicing was what these courses were supposed to prepare you for.

At present, Electronics General does not exist. Instead, George Brown College offers Certificate courses in

"Audio & Video Systems Servicing" (48 weeks) and "Office Systems" (52 weeks).

Seneca College in Toronto offers a Certificate course in "Electron Microscopy," — obviously, a very specialized field of study.

The next higher level is that leading to the title of technician. These courses are usually two years in length. They cover material in greater detail than the one-year courses, and hopefully lead to higher-paying, better quality jobs. Most



technician courses lead to employment in the servicing area of electronics.

Three years of study enable you to call yourself a technologist. Three-year courses lead to jobs that are, hopefully, one step above repair or troubleshooting, i.e. design, designing and/or building prototypes or perhaps assisting an engineer. Three-year technologist courses lead to what are called diplomas in the appropriate disciplines. Here we're getting into a big-time investment of your time. Many technology courses are offered only in the daytime, so you must find a method of supporting yourself (and maybe your family) while you attend school. However, many schools do offer these more advanced courses on a part-time basis.

Care to go all the way? If so, you can become an engineer and earn your electrical or electronics degree. These more involved and difficult courses constitute a major investment in your life of time, money and commitment.

Very few schools offer four-year degree programs on a part-time basis, so you'll probably need the better part of each work day free. This is easy if you're living with your parents and are being supported by them. This, however, is not quite as easy if you have a family of your own to look after.

Choosing a School

There are (in Toronto at least) four different types of electronic schools that you can choose. Right in the middle is the community college. Community colleges are a relatively recent (in my memory, anyways) development. They

sprang up to fulfil a very important need — that of the person who either doesn't want to or can't go to university after high school. Let's face it, we're not all Rhodes Scholar material. But I believe, we're all smart or intelligent in our own way. Therefore, the community college offers many different types of courses for many different types of people.

There are numerous private schools available for study. Often these schools

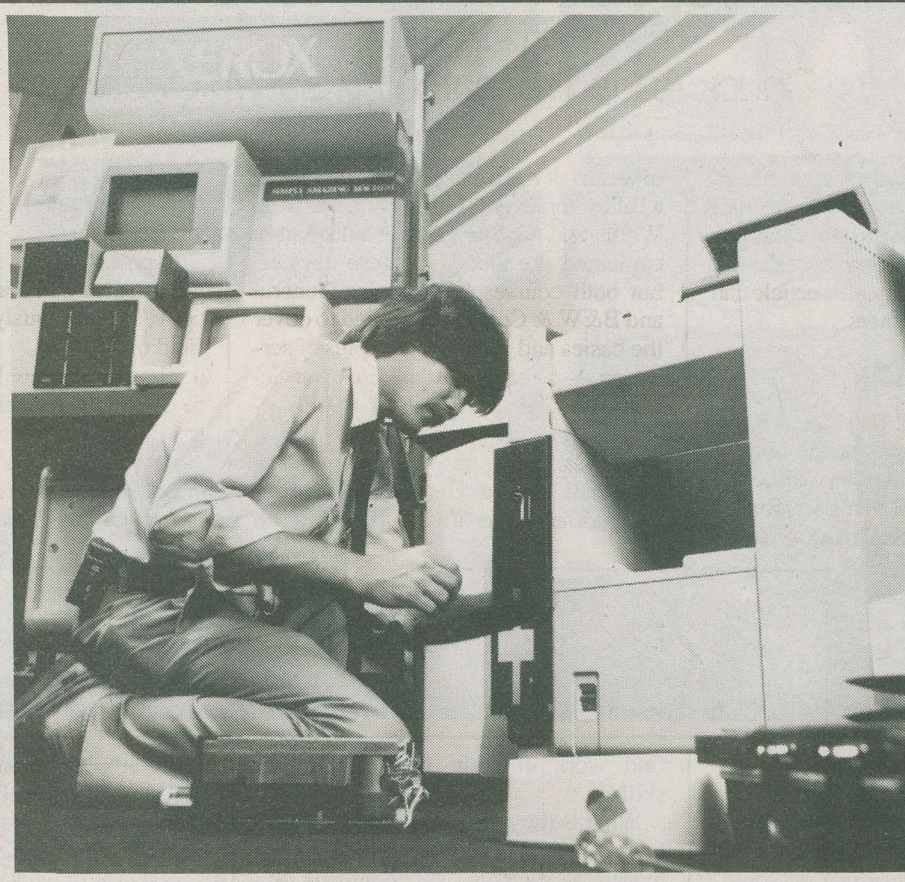
your own time so you won't have to give up your day job. NRI McGraw-Hill Continuing Education Center is one institution that has been offering home study courses for over 75 years. One thing that is unique about these courses is that you build and then get to keep various pieces of test equipment and even a computer. Grantham College of Engineering is another excellent school that offers home study.

Its courses include a Computer B.S. Degree Program and an Electronics B.S. Degree Program. For those who are busy at their jobs each day but still hungry to learn, correspondence courses could be the best way to upgrade their skills or learn new ones.

University represents the top level of study. A university course is usually four years of full-time study — a difficult task for most of us. If you have the ability, however, do you really want to shortchange yourself with an achievement you feel doesn't represent your best? Of

course it will be hard, but what great achievement is easily accomplished? If you have what it takes, why not "go for it."

There is one other option that is really inexpensive and you can achieve your educational goals entirely on your own. This is learning from books. This is definitely not for everyone. You have to be the kind of person who knows he or she can learn with little or no outside help. Books are really great — they contain literally all the world's knowledge, but to grasp and utilize that knowledge without the aid of a teacher is extremely difficult. You, yourself know whether or not you are capable of



boast a high placement rate. For example The Devry Institute in Toronto boasts 97% placement within 17 weeks of graduation. Often private schools publish lists of companies that have employed their graduates. They certainly do seem to offer more — perhaps many do. Many have services to help you with preparing your resume. The downside of course is that they are more expensive than community colleges. Are they worth it? Only you can decide.

Correspondence schools are another viable alternative for electronics study. Here, however, you are freed from being confined to your own immediate neighbourhood. Also, you can study on



this. There is another difficulty associated with learning from books. You don't get a diploma, or for that matter, any proof of your accomplishment. You may know you know or can do something, but will a prospective employer believe you without that proverbial "piece of paper"? Good question!

Let's Choose

So let's choose a school. Just open the Yellow Pages, and toss a coin, and start school. Well, perhaps just a little more thought should go into choosing which school you should attend. For example, can credits from one course be used as a prerequisite for another course? Or is the course complete in and of itself? Does the school offer a placement service? This is very important, since after graduating, most people would like to

find work utilizing their new-found skills.

What is the reputation of the school? Is it respected in industry and the community as a whole. This could be difficult to determine since anyone you talk to at the school can not be expected to give an unbiased opinion.

The Bottom Line

What's the bottom line? In my opinion, it's the classified and career sections of the daily newspapers. The job listings in newspapers are a great indication of what's out there and what's available in the job market. In many cases, this is where you will be looking for a job when you graduate. What greater indicator of trends in society could there be? For example, I see many jobs for computer programmer/analysts. This may then well be a good field to pursue.

There aren't as many electronic design ads as programmer/analysts but there are some and I see them on a regular basis. Reading these pages will give one a good idea of what potential employers are looking for.

Listening carefully to the news can also help in an intelligent career choice. For example, I've been hearing of many lay-offs in the aerospace industry lately. Therefore, I'd conclude that investing four years of my life to become an aerospace engineer might not be such a great idea at this time. I know I'd enjoy the study, but where would I work when I graduated?

A famous person once said "I am lucky, and the harder I work, the luckier I get." So good luck in your study search and may you work hard and be lucky too. □

Almost Free Software of the Month

Welcome to our feature, "Almost Free Software of the Month." In each issue we will feature an Almost Free Electronic & Scientific Software package, explain its features and show how it can be most effectively used. This month we are reviewing The Circuit Solver. The Circuit Solver will appear on the soon-to-be-released Volume 3 of Almost Free Electronic & Scientific Software.

by Chuck Ander

The Circuit Solver is an excellent, well-written program that will enable you to solve virtually any circuit problem. The program provides a graphic representation of the particular circuit as it prompts you to enter the voltage and component values. For example, to find out the resistance and the current flowing in a five-resistor parallel network, you simply type in the voltage and each resistor value. The Circuit Solver then calculates the total resistance,

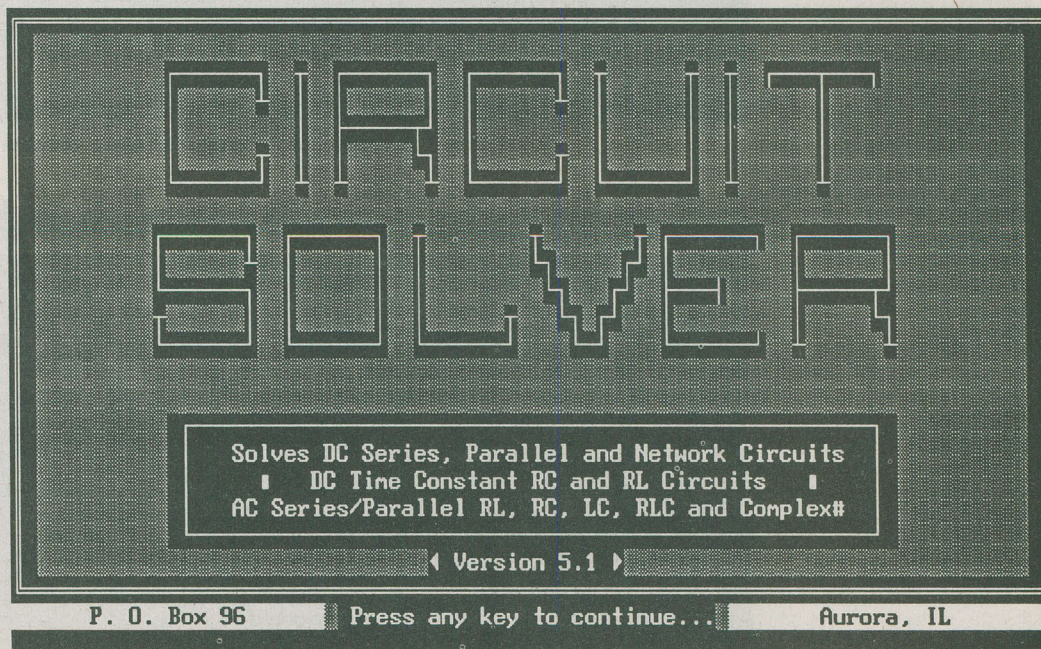


Fig. 1. The Circuit Solver Opening Screen

the total current and the total power (see figure 4). The program works in a similar manner for series and series-parallel circuits. AC circuits present no problem — neither do complex numbers or time constants. In fact, the Circuit Solver will automatically solve calculations for most DC series, parallel and network circuits, DC time constants, RC and RL circuits, AC series and parallel circuits, RL, RC, LC, RLC and complex numbers.

The Circuit Solver is a must for anyone who works with electricity or electronics; it takes the guesswork out of all basic circuit calculations. It can be used alone, or as a check when using conventional formulae for solving your electric/electronic circuit problems. □

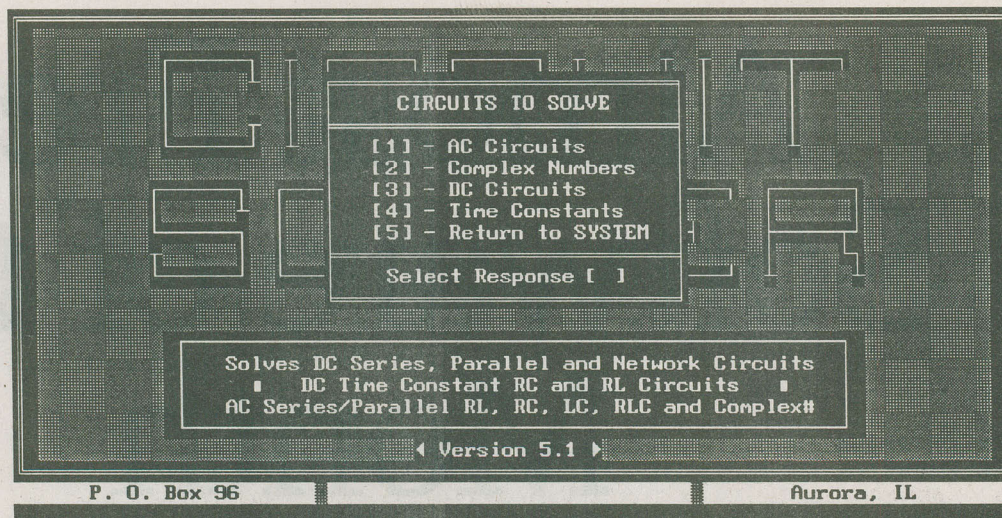


Fig. 2. The Circuit Solver Main Menu Screen

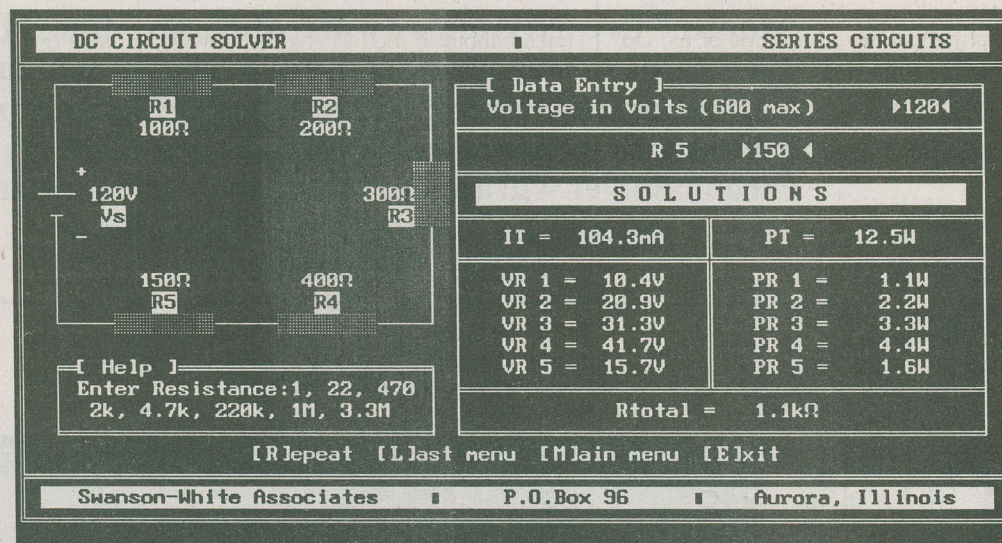


Fig. 3. Solving a DC Series Resistance Circuit

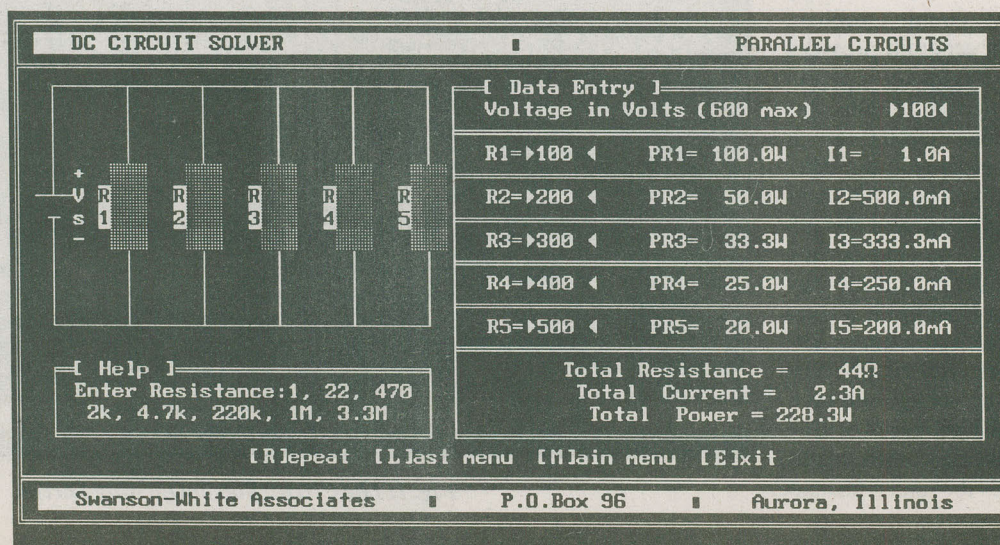


Fig. 4. Solving a DC Parallel Resistance Circuit

Basic Electronics

#6

by Ron C. Johnson

Murphy's Law states that whatever can go wrong, will, and at the most inconvenient moment. Those of us who dabble in electronics know that Murphy must have been one of us. On

the other hand, sometimes things do go right, but in a round-about way...

Last month I told you we would do some circuit building with op amps to put into practice some of the theory we talked about in the last segment. Well, Murphy intervened, but not in a bad

way. We are still going to build a project using op amps (and a few other components) but we'll also build a piece of equipment for your bench that you'll need in order to do more work with op amps — a triple output power supply with tracking positive and nega-

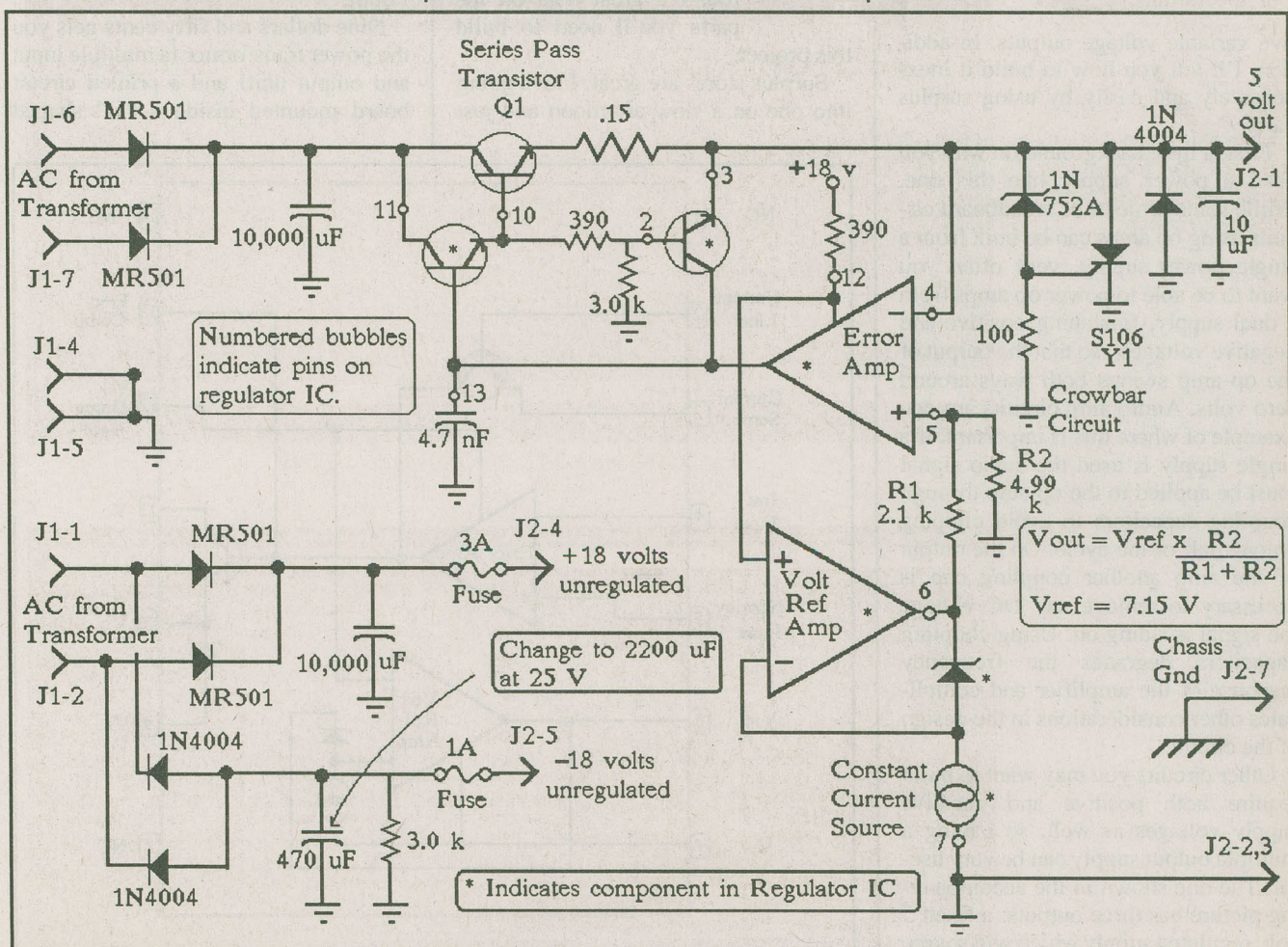


Figure 1. Schematic of Surplus Power Supply

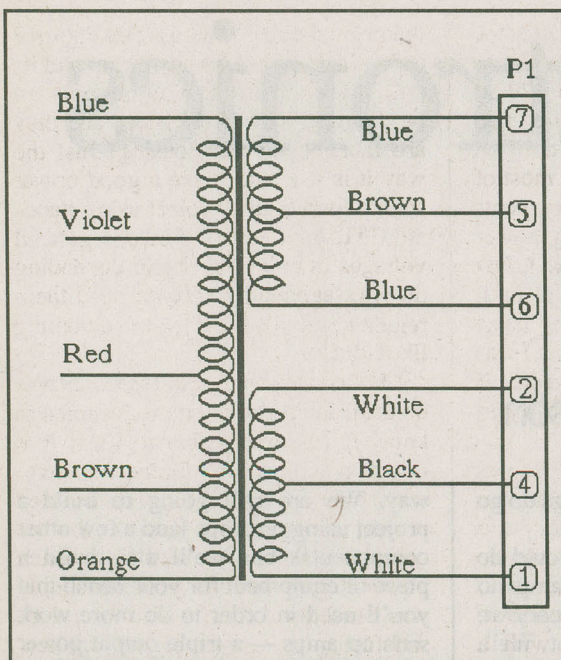


Figure 2. The Step Down Transformer

tive variable voltage outputs. In addition, I'll tell you how to build it inexpensively and easily by using surplus parts.

First, a little background on why you need a power supply like this one. While some projects or breadboard circuits using op amps can be built from a single power supply, very often you want to be able to power op amps from a dual supply, (matching positive and negative voltages), so that the output of the op amp swings both ways around zero volts. Audio amp circuits are one example of where this is important. If a single supply is used the audio signal must be applied to the op amp through coupling capacitors to avoid clipping on one half of the cycle. On the output of the amp another coupling cap is necessary to remove any DC voltage the signal is riding on. Using coupling capacitors degrades the frequency response of the amplifier and complicates other considerations in the design of the circuit.

Other circuits you may want to build require both positive and negative supply voltages as well, so having a multiple output supply can be very useful. The one shown in the accompanying picture has three outputs: a fixed 5 volt, regulated supply which will source up to 2 amps, and a dual, variable supply (all three have a common ground

point). The dual supplies will vary between about 1.2 volts and about 20 volts, one positive, the other negative. These supplies are also regulated and will source up to about 1 amp from either side. An added feature here is the ability to switch between independent control of each voltage or tracking control in which the negative supply tracks the positive supply. This is especially useful in those op amp circuits where you want the supplies to be equal and opposite.

I said that this supply can be built inexpensively by using surplus parts. That's where a positive aspect of Murphy's Law came in: I found a great deal on the parts you'll need to build

this project.

Surplus stores are great. I love going into one on a slow afternoon and just

poking around through all the quaint and obscure bits and pieces that accumulate on their shelves. Half the fun is just trying to make sense of what some of this stuff is and where it might have come from. Quite often the prices in these places have no relationship to reality. Obsolete junk goes for outrageously high prices (and people buy it for some reason) while the next item goes for some unbelievably low price.

Princess Auto is such a store. These guys have lots of stuff for the avid project builder, and some of it goes for reasonable prices. (They have branches right across Canada, by the way, so you should be able to find one relatively near you. In future segments of my column, "Tech-niques," I'll give you a run down some of the better items on their shelves.) For this project I found a great little power supply module which makes up the heart of the power supply I built.

Nine dollars and fifty cents gets you the power transformer (a multiple input and output unit) and a printed circuit board mounted inside a "U" shaped

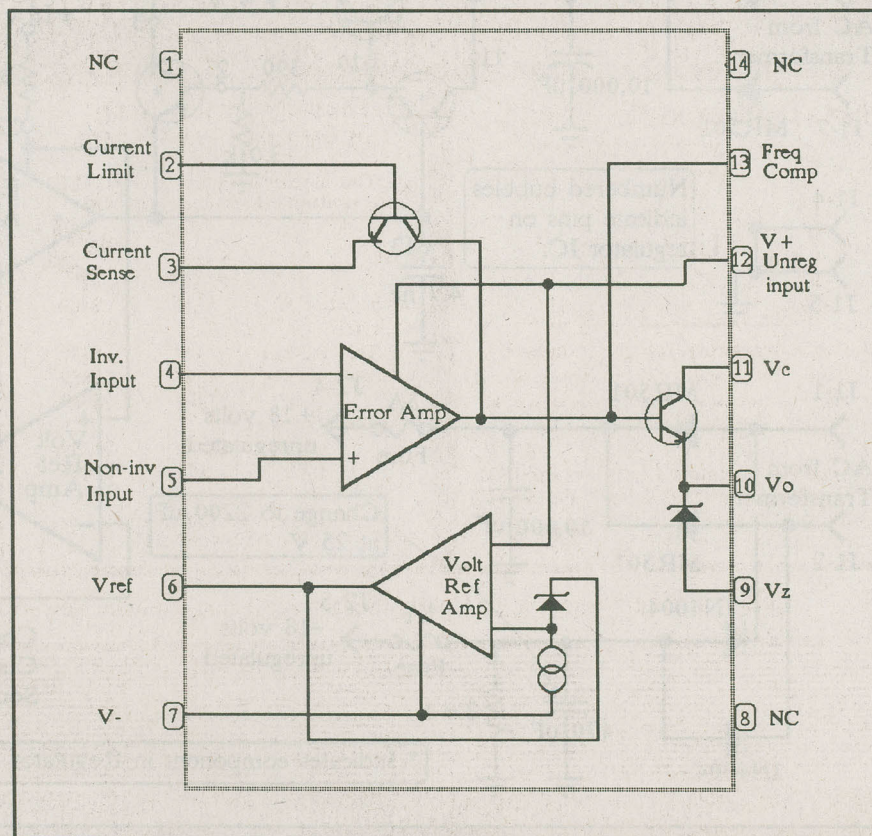


Figure 3. The 723 Voltage Regulator

metal housing. The information printed on the housing indicates that it was made by "Sierracin Power Systems" from Chatsworth, California (Assembled in Mexico) beyond which I have no idea what its original purpose was. (But I checked and they have lots of them in stock.) The rest of the printing on the housing tells the specifications of the power supply: +5 VDC, 2.2 amps; +18 VDC, 2 A pk, 1A Avg; -15 VDC, .1 A. It also tells how to pair up the wires on the input side of the transformer to use it with various line voltages.

On closer examination and testing I determined that the positive and negative supplies were unregulated and had on board fuses to limit their current to somewhere above the maximum value given on the housing. There appeared to be one integrated circuit with a part number I didn't recognise, an SCR on the top of the board, and a transistor

under the board, sandwiched against the housing to heatsink it. There were two 10,000 μ f capacitors and one 470 μ f capacitor and four large and two smaller rectifier diodes on board.

I probably don't have to tell most of you that nine dollars and fifty cents doesn't go very far in buying power supplies these days. In fact, the transformer alone would cost you at least twice that from most suppliers. Even though I wasn't sure exactly what I was getting I knew I had to be a good deal if it worked at all so I decided to try to make something out of it.

If you decide to run out to Princess Auto and buy one of these things you will find that they are easy to get up and running. If you just want a simple power supply for a project there is no need to make any modifications to it. The power transformer came with a plug-in connector on the end of the secondary wires, which plugs right onto

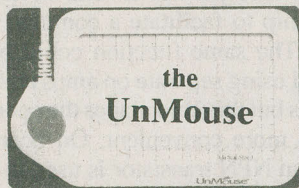
the printed circuit board. (See Figure 2 for a diagram of the transformer and its output connector.) The output pins are on the other side of the board and they are labelled on the housing. Just the way it is it would make a good power source for a digital project using standard TTL logic levels. The unregulated voltages may be a problem depending on your application. If you need them regulated you'll have to do something like I did.

My first step was to find out what was on the printed circuit board. I wanted to know if it was possible to fix it if it failed sometime in the future and also to see why the negative supply was rated at only .1 amp. This was too low an output for what I wanted in a bench power supply but the positive supply was rated for 1 amp which would be satisfactory for most of my applica-

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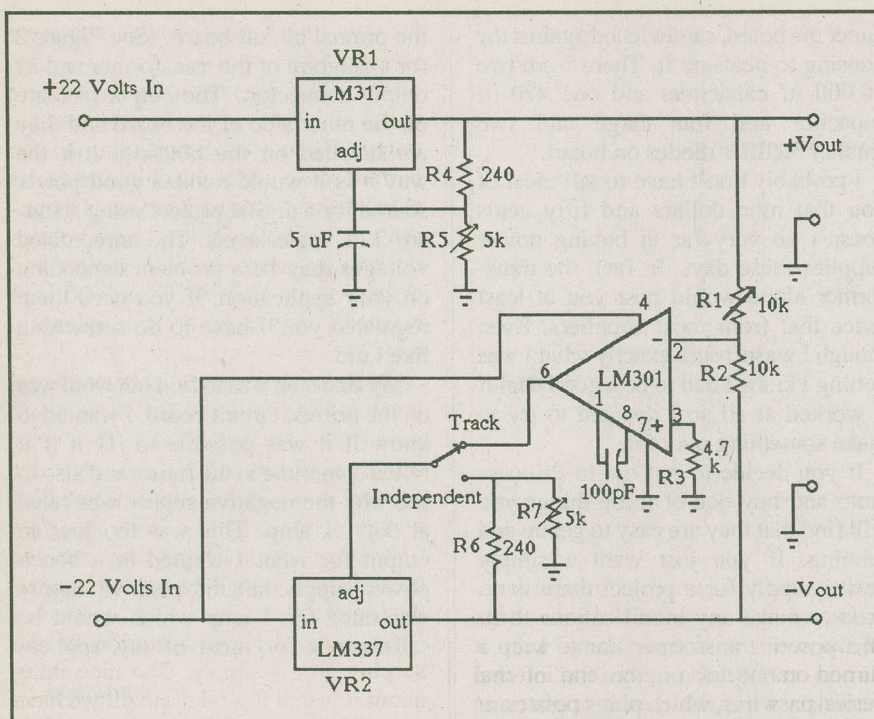


Figure 4. The Dual Tracking Regulator

tions. After tracing circuits on the board and attempting to determine what the "house numbered" parts were, I finally came up with the schematic shown in Figure 1.

I discovered that the 5 volt regulator on the board was controlled by the DIP integrated circuit, and though its numbering was unfamiliar it wasn't difficult to trace its connection to the transistor on the bottom of the board. Again, the transistor was "house numbered" but, using my trusty Fluke 77 I determined that it was an NPN power transistor connected as a series pass transistor. I was somewhat familiar with the LM723 voltage regulator chip which is often used in conjunction with series pass transistors in regulator circuits so I looked up its pin-out in a linear data book. Lo and behold, the external circuitry around the chip on the board looked just like the applications in the data book. The regulator on this board was just a renumbered 723. (See Figure 3 for a pin configuration diagram.)

I pursued tracing the circuit and drawing it out and found a couple of interesting things. The 5 volt supply has a "crowbar circuit" in it. This is interesting in itself and should be noted if you build your own supply. A crowbar cir-

cuit senses the output voltage of the power supply using a zener diode, and if it exceeds the 5.6 volts of the 1N752A, the gate of a power SCR receives a voltage pulse which turns on the SCR, shorting the power supply output to ground. In order for this to be effective (rather than catastrophic and dangerous) the input side of the power transformer must be appropriately fused. The regulator circuit does have current limiting (as we'll see shortly) but, if the series pass transistor were to fail in a shorted condition, current limiting wouldn't help. This whole circuit is

there to protect the circuitry in the circuit to be powered, from receiving a voltage level over 5.6 volts, which could stress, or destroy TTL logic circuitry.

Pursuing the task of tracing the regulator circuitry I also found the reason for the .1 amp specification for the negative supply. As shown in Figure 1 the negative supply uses the same centre-tapped windings of the transformer as the positive 18 volt supply. For the negative supply, however, 1N4004 rectifier diodes were used (good for about 1 amp) and the filter cap was a 470 μ F capacitor. The output of this had a 1 amp fuse in line. The limiting factor here is the 470 μ F capacitor. If currents exceeding .1 amp were required of the supply, the capacitor would not be large enough to smooth the output acceptably. As you will note from the diagram, I chose to remove the 470 μ F and replace it with a 2200 μ F capacitor which is still much smaller than the 10,000 μ F cap used in the positive supply but should be sufficient for my application.

While we're still looking at Figure 1, an explanation of the operation of the circuit using the 723 regulator would be in order. The 723 is one of those integrated circuits (like the 555 timer), which incorporates several devices on one chip to facilitate a common function. The same function could be obtained using separate op amps and transistors but this chip makes the operation much more convenient. On board the chip an NPN transistor is used to drive the base of the external series pass transistor. Actually, if you only want to

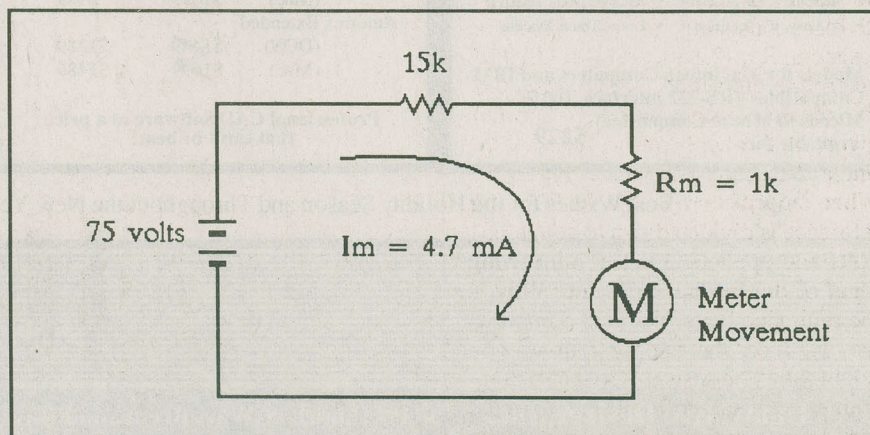


Figure 5. Original Meter Configuration

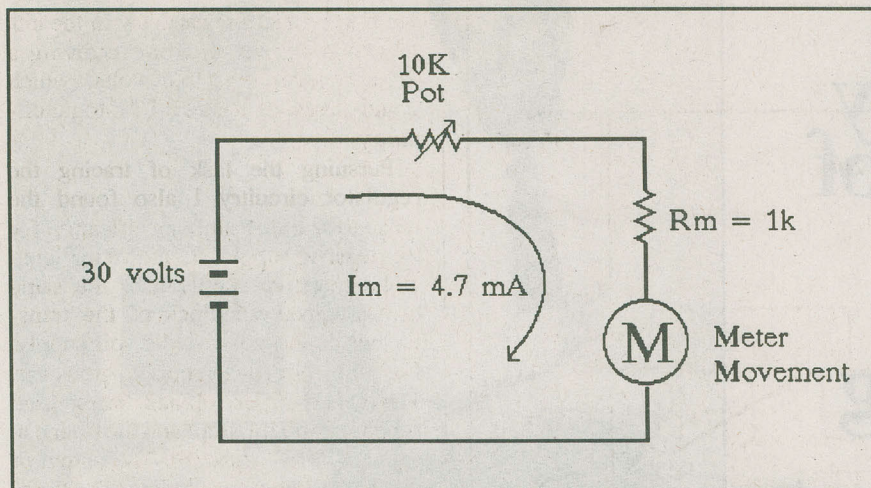


Figure 6. Revised Meter Configuration

regulate up to 150 mA, no external transistor is necessary. The internal transistor mentioned will do the job. The base of the internal pass transistor is driven by the output of an op amp. This op amp is being used in a DC mode with the inverting input tied to the 5 volt supply output line to sense any fluctuations in voltage output. If the output voltage decreases the inverting input will cause the op amp output to increase driving the pass transistor harder, turning it more fully on and allowing more current to reach the load. This should in turn increase the output voltage, all of which constitutes regulation.

The non-inverting input of the op amp is tied to the output of another op amp on the regulator chip. This op amp uses a combination of a current source and a zener diode to provide an extremely stable reference voltage (7.15 volts according to the specs) which can be used for comparison. A voltage divider consisting of two precision resistors, R1, (2.1 k), and R2, (4.99 k), determine the actual output voltage of the regulator according to a formula given in the application notes in the linear data book (shown on Figure 1). What happens here is that the 7.15 volt reference is divided down to about 4.51 volts and applied to the non-inverting input of the feedback op amp. Why is the reference lower than the 5.00 volts we want on the supply output, you might ask? The answer is in the base-to-emitter voltage drop of the external series pass transistor. The output of the feedback op amp must be kept more

positive than the output voltage in order to overcome the .6 volt junction voltage of the series pass transistor to keep it turned on. (We can ignore the internal series pass transistor as it operates as part of the op amp circuit and its B-E junction is already overcome.) Adding the series pass junction voltage, .6 volts, to the 4.51 volt reference gives about

5.1 volts on the output which is what we want.

The 723 achieves current limiting by using a .15 Ω resistor in line with the output voltage and connecting to the current sense pin of the chip. Inside the chip, the base-emitter junction of a transistor is biased according to the voltage dropped across the .15 Ω resistor and dependent on the 390 Ω and 3.0 k Ω resistors connected to the transistor's base. If the voltage across the .15 Ω resistor rises above a predetermined level, the current sense transistor's B-E junction is forward biased. This turns on the transistor, which has its collector connected to the op amp output. The current sense transistor "robs" the pass transistor of its drive coming from the op amp decreasing the current output of the regulator.

So much for the operation of the surplus power supply. The nice thing about it is that it works and all we have to do is connect it up properly. The next step in this project was to come up with a regulator circuit for the dual supply portion. First, I replaced the 470 μ F capacitor on the negative supply with a

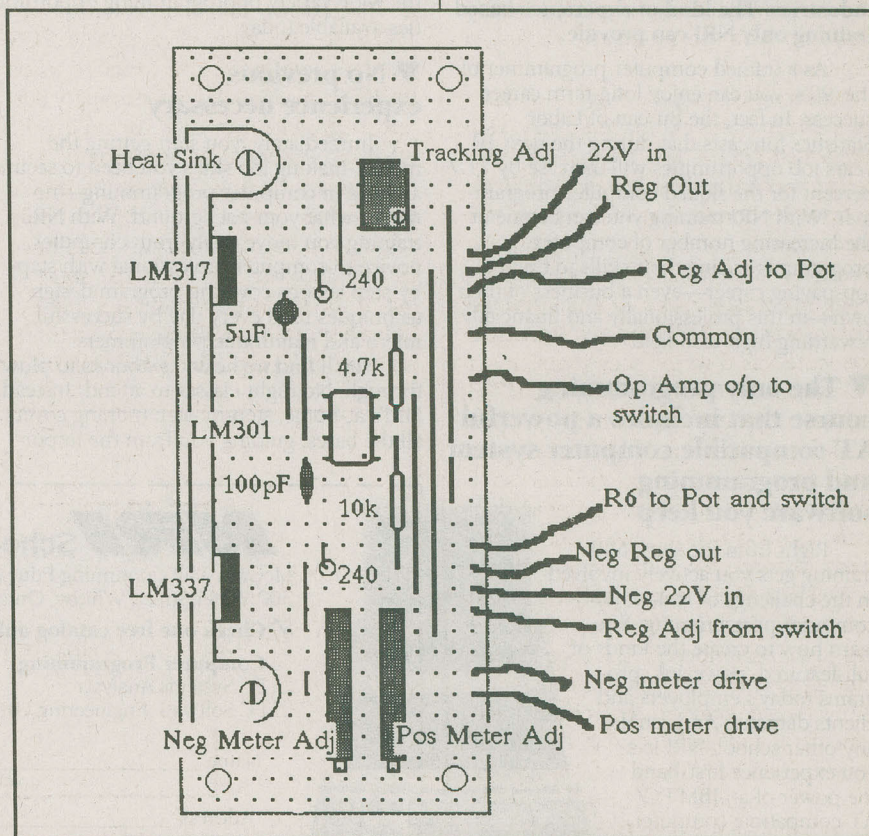


Figure 7. Add-On Regulator Board

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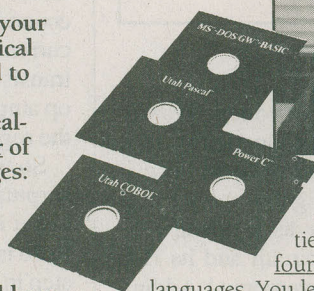
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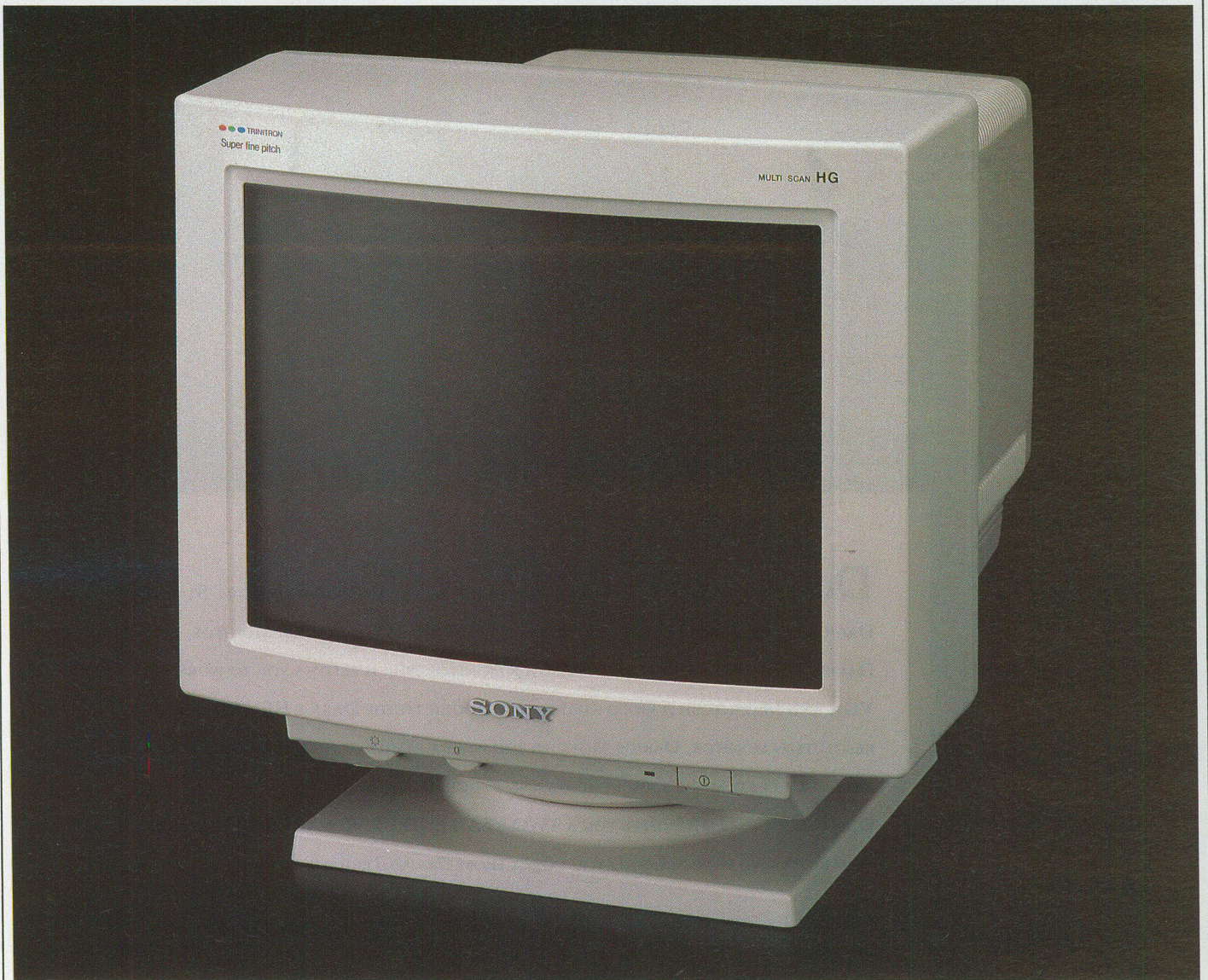
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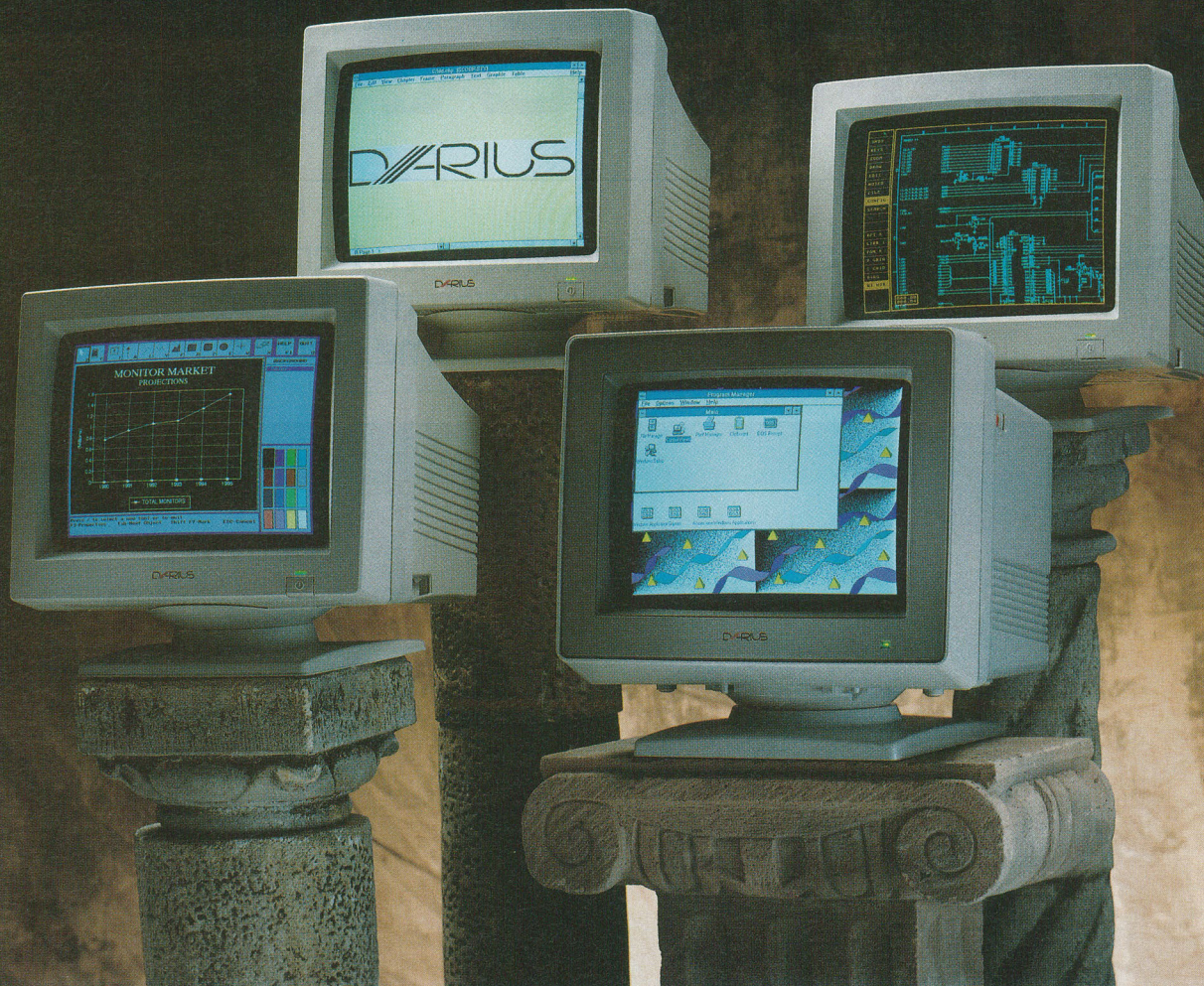
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Future ShopLocations Across Canada

It's hard to know whether monitor radiation is a genuine issue or something CNN Headline News dreamed up on a slow news day. A cathode ray tube unquestionably emits a measurable level of electromagnetic field radiation. The real issue is whether the relatively low level of field emissions from a cathode ray tube really constitute a meaningful health threat.

This article will not seek to deal with such an issue. It's probably unanswerable. It certainly cannot be answered empirically, and the statistical evidence surrounding this issue is ambiguous at best. It might be fairly said that there *could* be a health threat from monitors. If you feel that this is true, buying a low radiation monitor seems to be a good way not to have to find out who's right.

If you use computers in your business, having installed monitors designed to reduce the amount of field emissions may have some legal value if you subsequently find yourself confronted with a damages suit. You should consult a lawyer in this regard.

The Copam 1400 series monitors have been explicitly designed to produce field emissions which are lower than those of conventional monitors. Manufactured in Taiwan, the 1400-30LR has a list price of \$735.00

Business Graphics

The Copam 1400-30LR is a fairly conventional looking monitor. It uses a .28 millimetre, fourteen inch display tube with etched glass to reduce its surface glare. It will sync at up to 35.5 kilohertz horizontal frequency and up to 90 hertz vertical frequency. Its 45

The Copam 1400-30LR Low Radiation Multisync Monitor

by Arthur Bear

megahertz video bandwidth is somewhere in the middle of the range for contemporary monitors.

It seems fair to say that the Copam is designed for use in an environment which calls primarily for text mode and business graphics applications. It can display Microsoft Windows at sixteen colours with no significant distortion or image disparities out to 800 by 600 pixels.

Inasmuch as most office environments — where a low radiation monitor is likely to be found — call for these sorts of applications, the characteristics of the Copam are well suited to its intended use.

There are a number of features of the Copam which are unusual in mid-range monitors. For example, it has internal circuitry to adjust its image brightness based on the overall picture content, such that having the screen change quickly from a mostly dark display to one which is largely white won't cause it to bloom or change size. It seems to all but eliminate the annoying flicker which many monitors display in their sixteen-colour business graphics modes.

Unlike many contemporary monitors, the Copam has all its user controls up front, hidden behind a hinged panel. This makes them easy to get at — it also obviates the need to reach around to the back of the monitor to adjust it, pressing yourself closer to the source of whatever electromag-

see Copam, page 9

With the wide variety of display modes used by contemporary computers, it might well be argued that the only thing capable of dealing with them would be another computer. The Mag monitor includes one.

4

The Mag MX15H isn't just a monitor. It uses a microprocessor to manage its drive parameters. While this may seem like a bit of overkill — one step removed from a microprocessor controlled toaster — it makes for a powerful display device. The Mag can be programmed to handle mode switching without the need to manually adjust anything, and it's capable of intelligently sensing what it's supposed to be doing.

On top of this, the Mag is a pretty good monitor. It can handle anything from the basic PC text modes right on out to 1280 x 1024 pixel, 256-colour graphics without a hiccup. It features a better than average picture tube with a fairly flat surface.

The only arguable drawback to the Mag is its size and weight. It's a bit huge, tipping the scales at over thirty-five pounds. This is, presumably, at least partially due to its on board intelligence. While its weight hardly matters once it's atop your computer, you might be grateful for some assistance carrying it in.

The Mag is of Taiwanese manufacture, with a suggested list price of \$930.00.

Intelligent Mode Switching

It's relatively easy to design a monitor to display a stable image in one mode. It's much harder to do so for several modes, with the problem becoming more acute as the technical differences between the various modes grow more pronounced. Confronted with the range of modes available on a contemporary super VGA card, a conventional analog monitor usually has a hard time switching from, say 80 by 25 line text to 1280 x 1024 pixel graphics without a noticeable change in the aspect ratio of the screen. Many monitors can hang on by their fingernails in the higher resolution graphics modes, but with substantial image distortion or some pretty troublesome screaming from their circuitry.

The Mag monitor addresses this problem by ignoring it. Rather than having elaborate analog circuitry to handle the extremes of a PC's display modes and everything in between, it has an internal microprocessor which can sense which mode it's switching to and adjust its display parameters accordingly. As such, having been set up for the display modes you will be using, it requires no manual adjustments when you change modes. In a sense, it fine tunes itself, the digital equivalent of reaching up and turning its own controls.

The result of all this is that it can change modes without either any momentary disorientation or a

The Mag MX15H Multiscan Monitor

by Arthur Bear

visible difference in the aspect ratio or overall appearance of its display.

Setting up the Mag is pretty elementary; assuming that you don't like its factory presets, you can adjust them by displaying an image in the mode you want to teach it about and then instructing it to remember what the new mode looks like. In fact, the factory presets in the review sample I got handled all the available modes I could think of. I had to program a VGA card to create a non-standard mode to create a situation which the Mag couldn't handle, and hence had to be programmed for. Once programmed, it subsequently managed the new mode as if it had been taught to it at the factory.

Powerful Specifications

Nothing about a monitor matters if its picture tube isn't worth looking at. The Mag has a pretty good one. Supporting a .28 millimetre dot pitch on etched, non-glare glass, you can look at a Mag monitor for extended periods of time without having your eyes fall out.

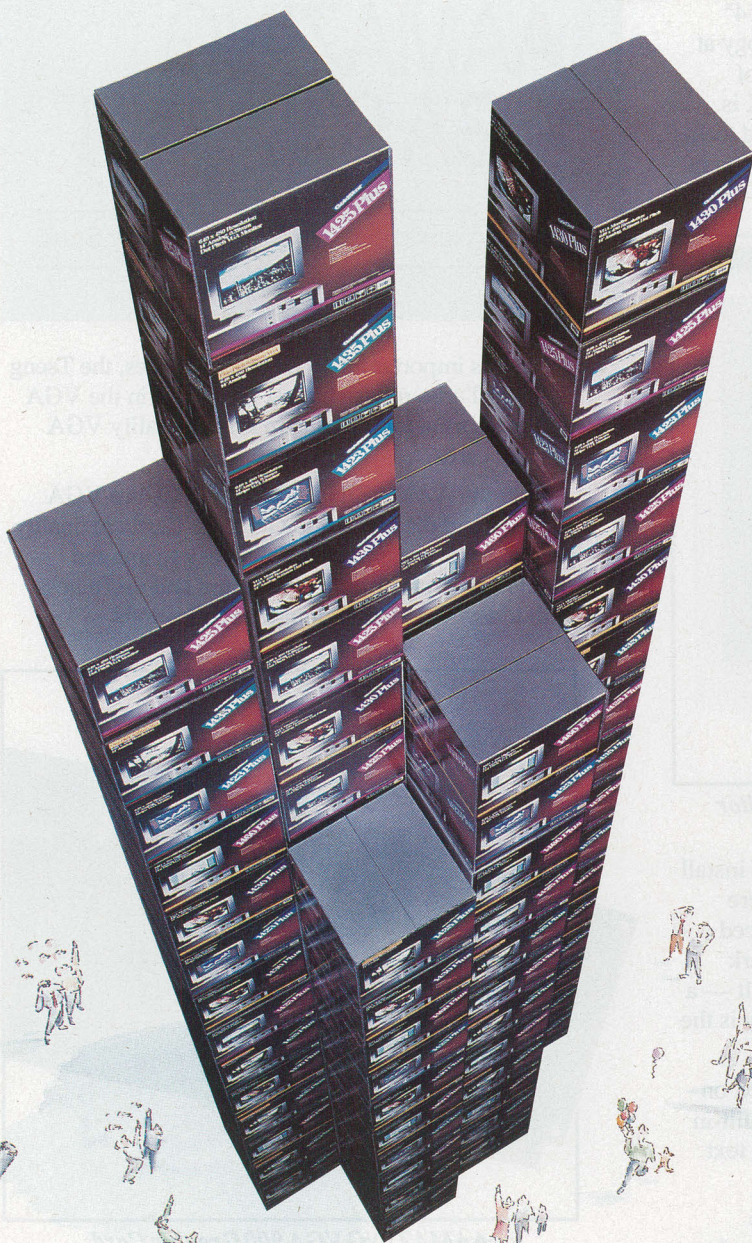
The Mag MX15H can handle interlaced and non-interlaced pictures. It will handle up to 68 kilohertz horizontal and up to 120 hertz vertical frequencies, which is well in excess of anything a contemporary PC display card is likely to ask it to deal with. It can be supplied with an optional Macintosh BNC adapter as well.

Because its control circuitry is all digital, the Mag's controls are too. Rather than using rotary controls for things like size and brightness, it has push switches. Because monitor controls don't get used a lot, they tend to become dirty and erratic pretty early on. The wholly electronic switches of the Mag eliminate this problem.

It would be difficult to find anything disagreeable about the Mag MX15H. A first class display device, it's well engineered and as state-of-the-art as one could imagine. Aside from being capable of coping with anything a VGA card can send it, this monitor promises to remain current for the foreseeable future.

For more information contact: Zekom Electronics, 120 West Beaver Creek Rd., Unit 6, Richmond Hill, Ontario L4B 1L2 Tel: (416) 882-2112, Fax: (416) 882-2120. □ Circle No. 4 on Reader Service Card

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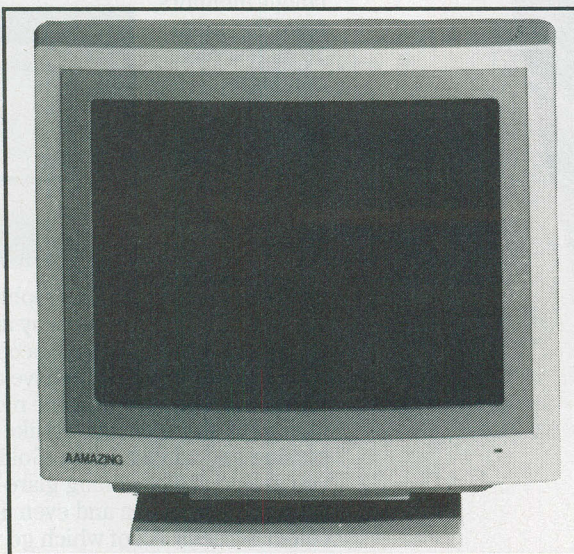
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6



AAMAZING CM8486TX Ultra VGA Monitor

The CM8486TX and VGA 900 were easy to install and the brightness and clarity of the display were pleasing and easy to look at. Being non-interlaced and using a 0.28mm dot pitch and non-glare dark tinted glass certainly produced the desired result — a great image. Also contributing to picture clarity is the 1024 by 768 resolution (in graphics mode).

Say you'd like to change the colour of the text on the screen — no problem. The monitor has a built-in text switch which will change the colour of the text to amber, green or white.

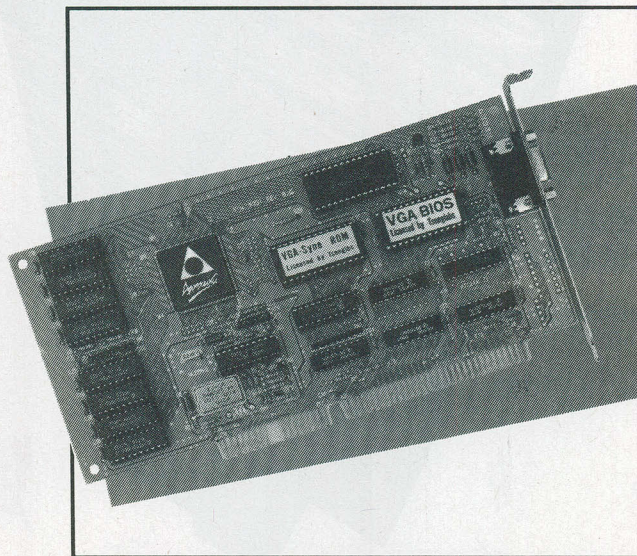
The AAMAZING VGA 900 graphics card is designed to get the maximum performance from the CM8486TX Ultra VGA Monitor, or any other monitor for that matter. In fact it will support non-interlaced and interlaced modes and is compatible with VGA, EGA, Hercules, MDA and CGA. It will give up to 1024 by 768 resolution in 256 colours with 1 MB RAM.

AAMAZING CM8486TX Ultra VGA Monitor and AAMAZING VGA 900 Card

By Electronics & Technology Today Staff

No less important than its other features, the Tseng ET4000 Turbo mega chip set contained in the VGA 900 card is the top-rated chip set for quality VGA graphic cards.

Both the AAMAZING CM8486TX Ultra VGA Monitor and the VGA 900 Graphics Card are quality products that are easy to install, easy to use and should give many hours of pleasure and usefulness with today's modern computer applications.

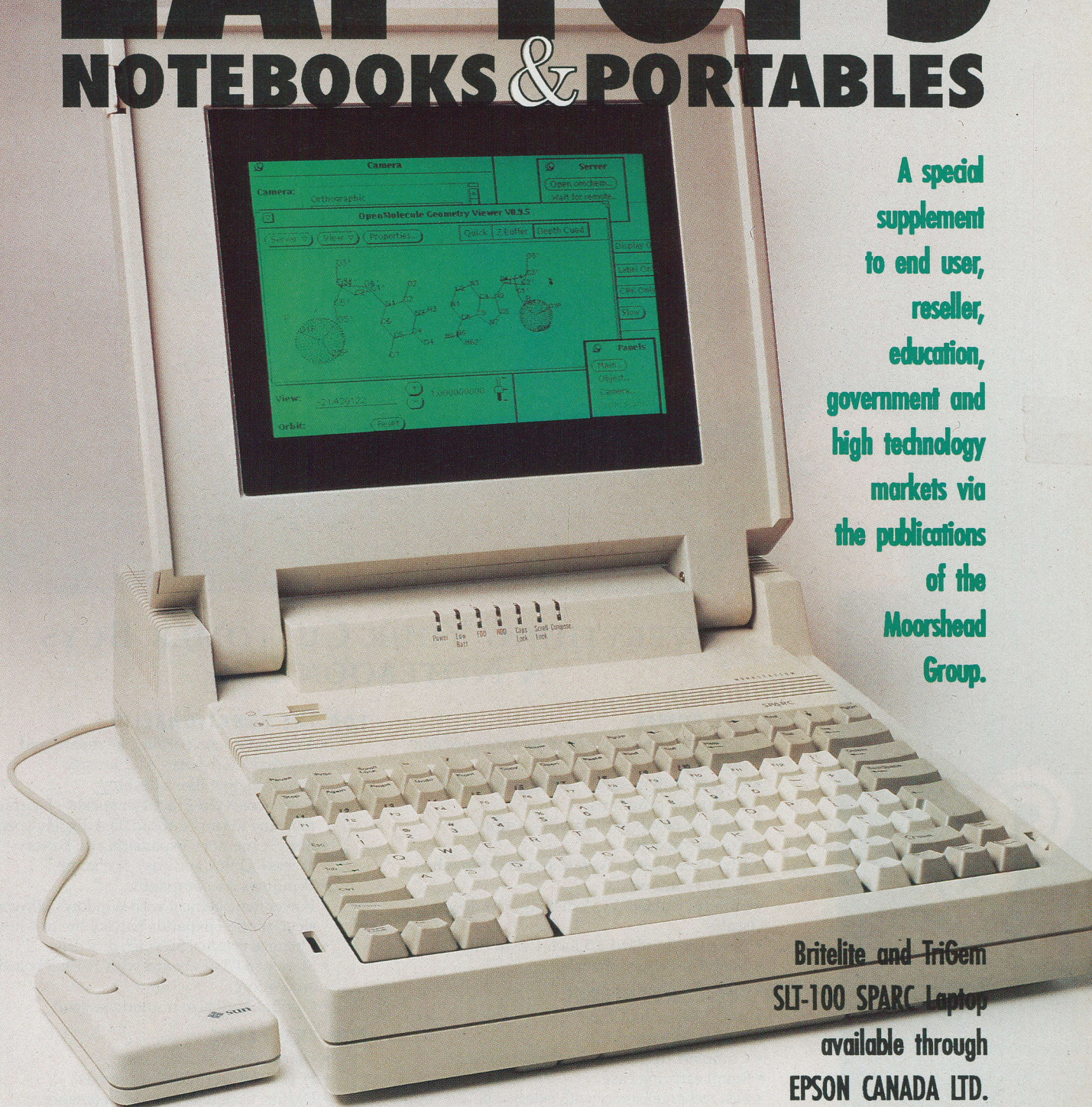


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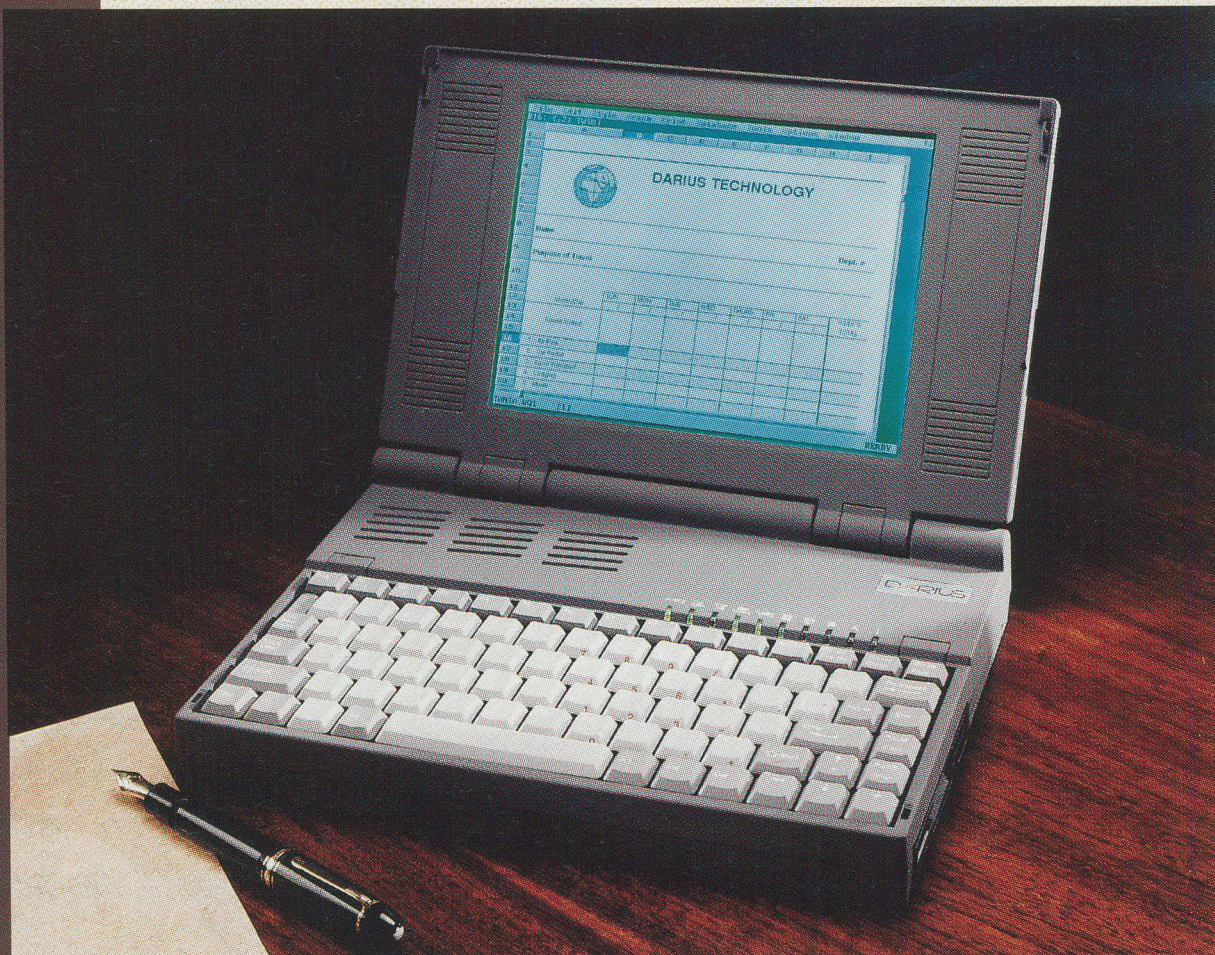


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Laptops, Notebooks & Portables

In the past, the perception was that portable computing would be dominated by a handful of off-shore manufacturers — mostly from Japan.

It was argued that constraints such as the engineering technology needed to make a smaller computer would prevent most desktop manufacturers from entering the fray.

Yet today, instead of an oligopoly of portable computer manufacturers, the market is deluged with laptop and portable entries from literally dozens of companies. And the companies considered most likely to dominate portable computing have a fight on their hands to retain market share.

All of this comes as a benefit to the consumer, because as in the evolution of the desktop market, vendors of portable computers are now compelled to provide more features at a lower price.

From Panasonic's perspective, the winners in the portable computing derby will be the manufacturers who can i) match customer expectations and ii) go one step further and surpass customer expectations. Let's examine both points in greater detail.

Matching Customer Expectations

When it comes to size, weight, battery power and a host of other variables, what was once luxury is now the norm in portable computing.

Notebooks must weigh less than 7 lbs (including battery). The computer must be true notebook size (around 8½" x

Formula For Success: Surpassing Customer Expectation

By Edmund Yeung, Product Manager,
Panasonic (Matsushita Electric of Canada
Limited)

11") while including a 3½" floppy disk drive and a 20-40MB hard drive.

Expectations for the keyboard and display have also grown. The display must have at least VGA resolution with a double or triple supertwist level of brightness. And the keyboard, while still not on par with its desktop counterpart must be functional, with good-sized keys and a decent tactile feel.

Dependable battery power is also a must. At the very least, customers expect to get 2 hours of computing in before recharging the battery.

In the past, many of these features were viewed as a luxury, today they're considered the norm and tomorrow you can be certain the customer's standards will be even higher.

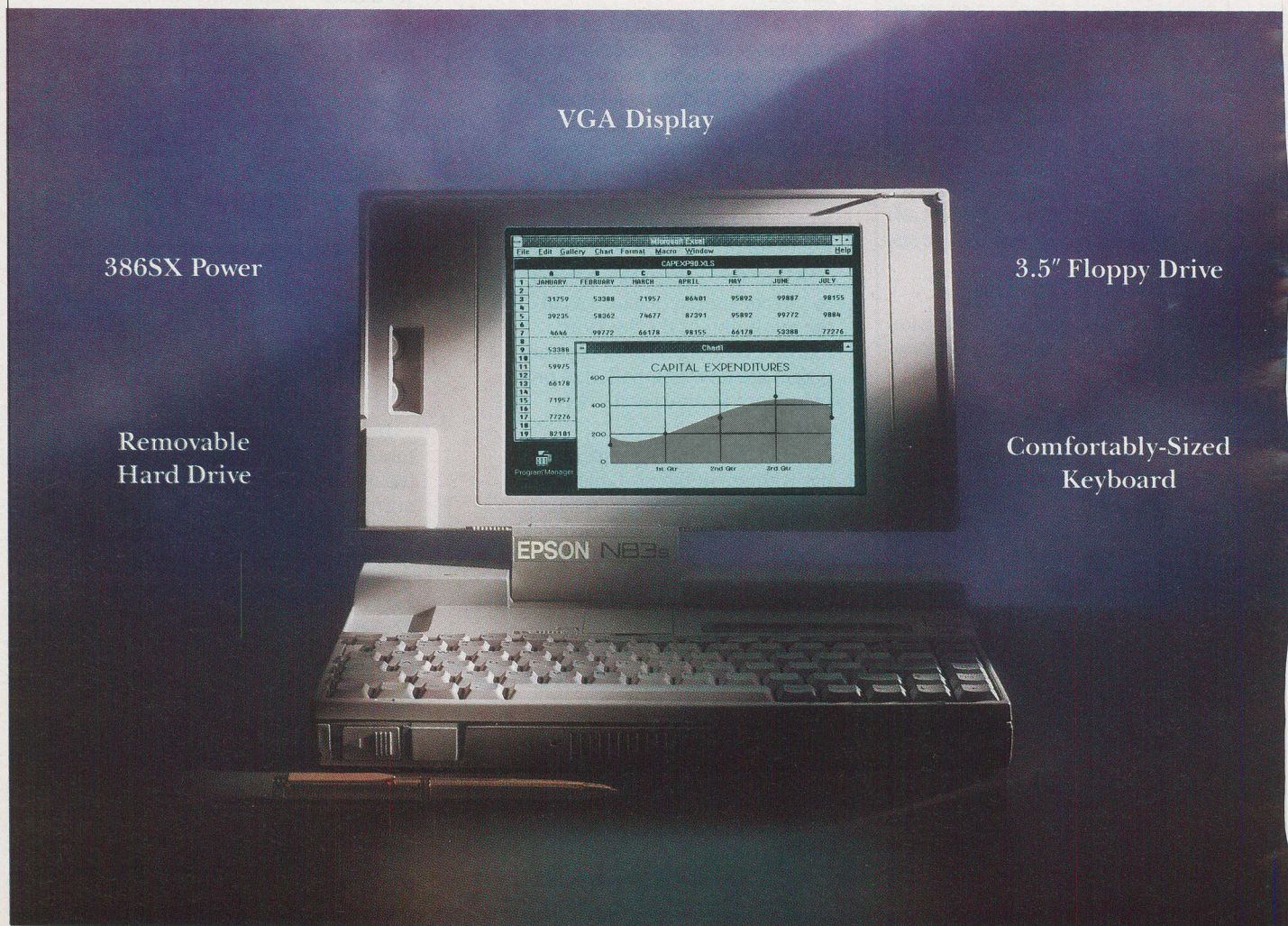
Surpassing Customer Expectations Today

Not all manufacturers can meet the basic expectations described above (although they are catching up) and fewer still are offering features that surpass these expectations.

In seeking to differentiate Panasonic brand notebooks, we've opted for tangible, performance enhancing features versus

see Success, page 11

Any rese to a desktop purely in



mbalance computer is tentional.

Introducing the Epson 386SX Notebook Computer.

Until now, opting for a portable computer has typically meant settling for less computer.

The new 5.8 pound Epson® NB3s notebook changes all that. In a big way.

Inside this stunningly compact package lies the computing power equal to that of a 386™ SX desktop. With more than enough memory—up to 5MB of RAM—to run all the leading business applications, such as Windows™ 3.0.

The backlit LCD screen produces crystal-clear VGA graphics. And the NB3s comes with a standard 3.5 inch floppy drive, plus the innovative choice of

removable 40MB or 20MB Conner® hard drives.

This 5.8 pound package even includes a rechargeable battery, plus room for such options as an internal modem and math coprocessor. And with its optional portable expansion unit, you gain two standard card slots and the ability to add a 120MB hard drive for true desktop expandability.

By any measure of performance, the Epson NB3s is a giant among notebooks. In fact, you could say it is the perfect computer for the portable user who wants everything. Except compromise.



Here is where the resemblance ends:

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DARIUS TECHNOLOGY

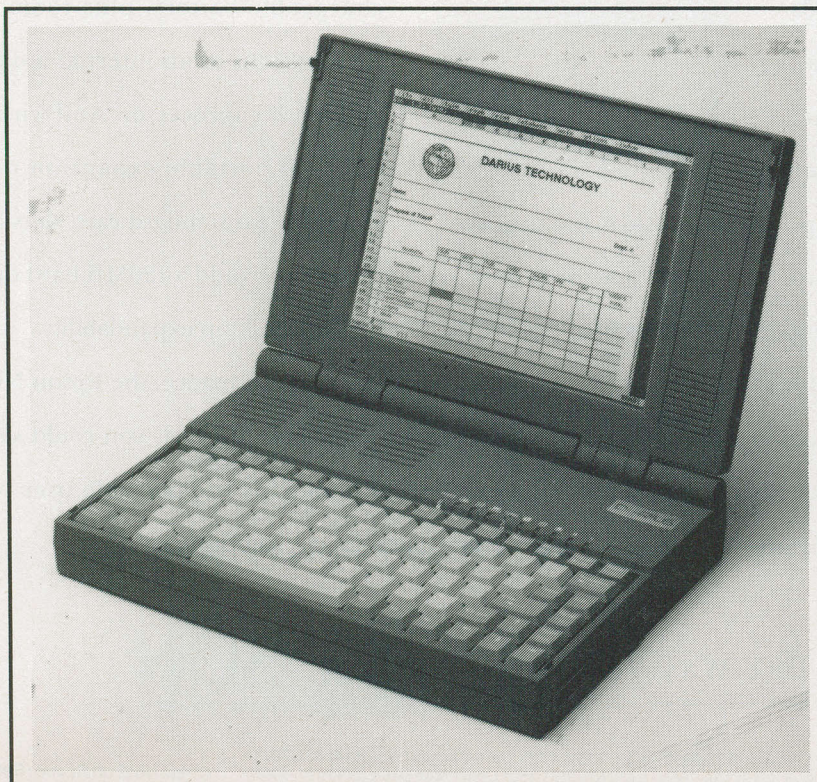
Today's executives require desktop computer power and features in a notebook size. The Darius Professional notebook computer with its unbeatable features in a package weighing less than 7 lbs meets this challenge.

The Darius Professional notebook computer uses an Intel 80386SX CPU running at 20MHz; 1MB RAM on board, expandable up to 5 MB, 640x480 VGA LCD display with 16 grey scales, one 3½" floppy disk drive and one 2½" 20 MB hard disk drive with optional 60 MB hard disk drive. With ports for both external keyboard and Super VGA monitor, the Darius notebook can also double as a desktop for general business use.

The first thing you notice about this unit, aside from its compact and neat appearance, is the screen — it's really bright and easy-to-read. This LCD monitor is one of the best I've seen. You can adjust display contrast and brightness (located on the right side of the LCD panel) for optimum readability. You can also connect an external VGA monitor to the system through the CRT port on the rear panel.

The Darius Professional 386 also offers the Floppy Drive Case, which enables an end-user to "plug-in" the floppy drive of their choice at a fraction of the cost of an external floppy drive.

6



Review: Darius Professional 386 Notebook Computer

by E&TT Staff

According to Mr. Tam, President of TK-IDM Technology, "The Darius notebook computer was designed for the executive on the move or in the office. With the 60MB hard drive, up to 5MB RAM and fast refresh LCD screen, this notebook is ideal for running all the sophisticated software programs on the market today. All these features in such a small footprint are an indication of our commitment to quality and fulfillment of users' demand."

TK-IDM Technology is the exclusive distributor of Darius products in Canada. The Darius Professional notebook computer is available immediately. The suggested retail price for the 20MB unit is \$2,499 and for the 60MB unit it is \$2,999. Dealers may sell for less.

For further information contact Sales Department, TK-IDM Technology Ltd., Eastern Office, 3818A Victoria Park Ave, North York, Ontario M2H 3H7 Tel: (416) 496-1218 Fax: (416) 496-8873. Western Office: 2808 Ingleton Ave., Burnaby, B.C. V5C 6G7, Tel: (604) 654-1818 Fax: (604) 654-1819. □

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Weighing in at just 5.8 pounds, (including battery) and featuring a 386SX processor, the Epson NB3s offers an exceptional blend of power and portability.

Since it's only about the size of an 8½" x 11" notepad, the compact NB3s tucks nicely away inside a briefcase, so users can carry all their familiar desktop applications with them. It comes complete with MicroSoft Windows 3.0, a file manager, a utility to change the screen shades and a utility to provide basic DOS utilities such as backup and restore, disk copy or format.

8

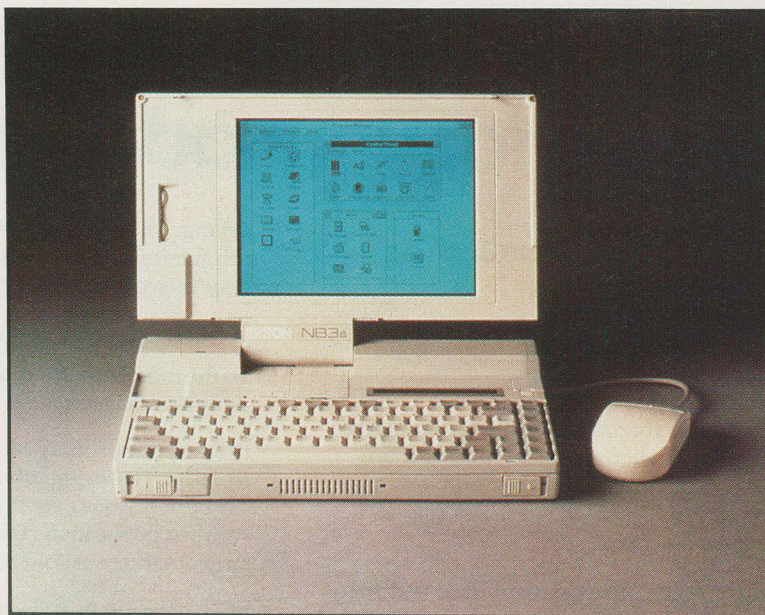
Features and Options

Standard features include an easy-to-read 640 x 480, VGA display, a 1.44 MB 3.5" floppy disk drive and 1MB of RAM (expandable to 5MB using Epson's optional RAM cards). Serial and parallel ports provide compatibility with printers and other peripherals, while an optional VGA monitor, internal modem or keypad can be connected via the NB3s' built-in interfaces. Support for an optional math coprocessor is also provided.

Removable Hard Disk Drives

Optional 20MB, 40MB and 60MB removable units swap quickly in and out to provide an extraordinary level of portability, data security and system expandability. Storage upgrades have never been faster, easier or more convenient.

On the road, the NB3s is powered by a lightweight, removable nickel-cadmium battery pack. Under typical operating conditions, the pack provides power for an estimated 1 to 1.5 hours. For even longer, more productive mobile computing sessions, Epson includes an additional battery pack at no extra charge.



Review: Epson NB3s: The Ultimate Notebook Computer

by E&TT Staff

Expansion Unit

If additional power is required, the NB3s can be plugged into an optional lightweight Epson Expansion Unit. The unit is extremely compact, versatile and has two full-sized, AT[®] expansion slots. It also supports an optional 120MB removable hard disk drive. A built-in AC power supply enables desktop

operation and provides simultaneous recharging of the battery pack. Since the combined weight of the computer and Expansion Unit is less than ten pounds, users experience unsurpassed levels of portability and exceptional carrying comfort.

The Expansion Unit and its array of innovative accessories give the NB3s the distinction of being the most modular versatile and portable computer that

Epson has ever built. The NB3s comes with a one-year limited warranty and is backed by a nationwide network of authorized service centres.

The suggested list price of the Epson NB3s is \$4,500. For more information contact Epson Canada, 95 Mural Street, Suite 600, Richmond Hill, Ontario L4B 3G3, Tel: (416) 881-9955, Fax: (416) 881-1831.

□

Major players to participate in Canadian Computer Show



The *Canadian Computer Show and Conference* reports signs of heightened optimism in the Canadian computer industry as an increased number of major industry players commit to participate in this year's Show, which will take place from October 21 to 24, 1991 at the International Centre in Mississauga. Show management largely credits an improving Canadian economy and a current trend among businesses toward increasing technological productivity in the workplace.

Among the major exhibitors is IBM Canada Ltd., absent from last year's show, which this year has reserved the largest space it has ever occupied in a Canadian trade show. Canara Technologies Inc., distributor of Samsung computer products, will participate in the show for the first time. Returning exhibitors include major computer hardware and peripheral companies such as Canon, NEC, Sharp Electronics and Fujitsu and key software developers such as Microsoft, Computer Associates, WordPerfect, Lotus and Corel Systems.

"The Canadian Computer Show al-

lows IBM to reach a broader audience than our traditional efforts provide," said Harvey Lewi, Manager, PS/2 System Software of IBM Canada. Steve Preiner, Advertising Manager of Canara Technologies, agreed: "We believe the show will help increase awareness of our products and provide added exposure to a wider audience of end-users as well as dealers," he said.

According to Robert Grainger, Group Show Manager of the Canadian Computer Show and Conference, exhibit space sales are now increasing steadily because "feedback from our exhibitors indicates that confidence and marketing efforts are up in the computer industry largely due to a recovering economy." Grainger also said exhibitors are capitalizing on a current trend among businesses to improve their productivity in today's highly competitive market by better utilizing computer innovations.

The Canadian Computer Show and Conference is Canada's first and largest computer show. The theme of this year's show will be "productivity in today's competitive environment," highlighted by more than 400 exhibi-

tors displaying business systems, networking and software applications. More than 32,000 registered attendees are expected to attend, from all levels of the business, government, industry and reseller sectors.

The Canadian Computer Show and Conference is managed and produced by Industrial Trade and Consumer Shows Inc., a subsidiary of Maclean Hunter with headquarters in Toronto and offices in Vancouver, Calgary, Ottawa and Montreal.

The Canadian Computer Show is open to business persons for a preregistration fee of \$10 or a registration fee at the show of \$20. The show runs from 10 am to 6 pm, Monday, October 21 through Thursday, October 24.

For further information:

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- * Doering And Brown, Booth #2510
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- * Easy pay, Booth # 1112
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- * EMJ Data Systems, Booth #3120
- * Empac, Booth #5265
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- * Firefly Books Ltd., Booth #3410
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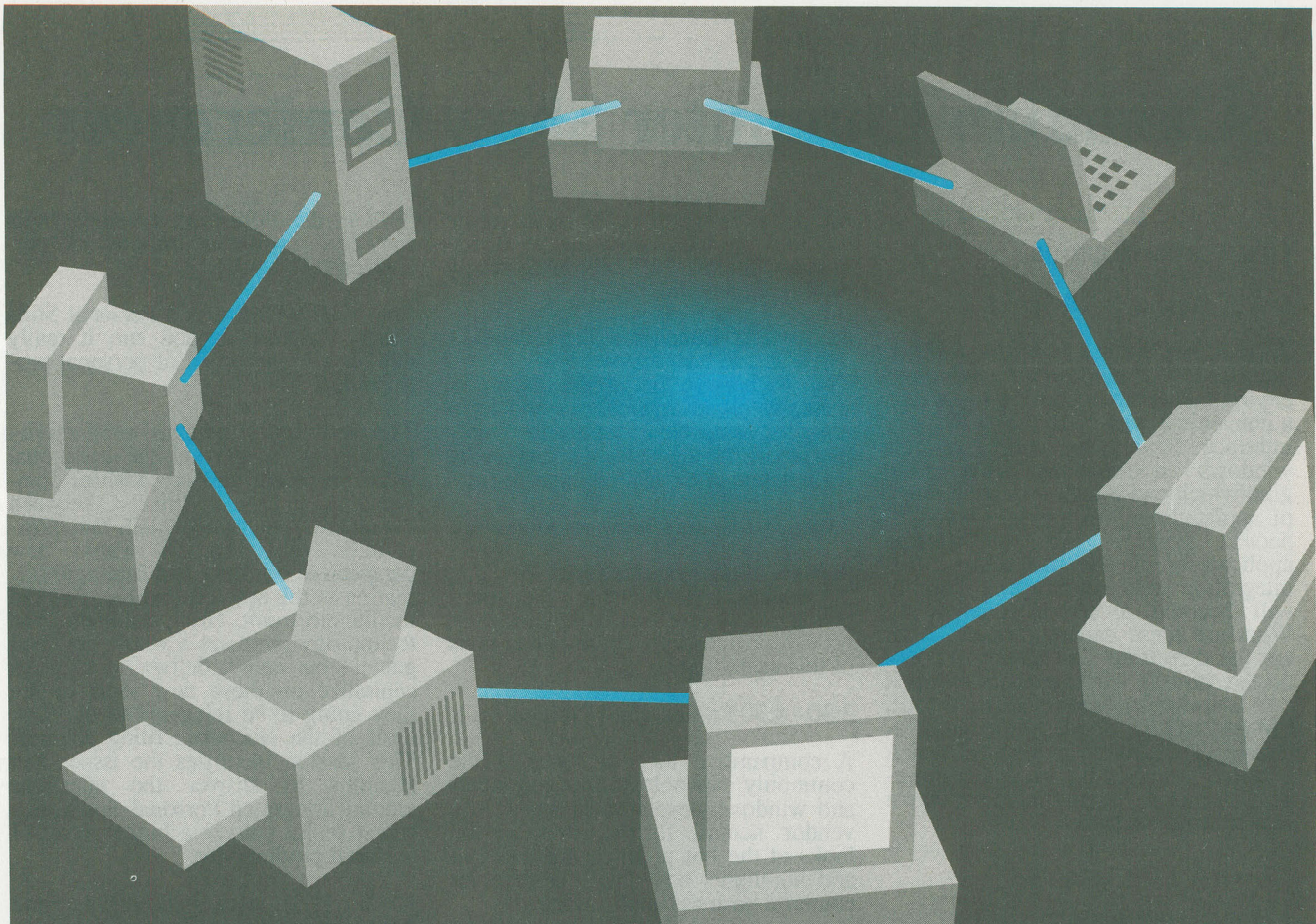
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- * Technical Logistics Support, Booth #1147
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Canadian Computer Show Conferences

Conference Agenda

Day 1, Monday, October 21

Title: Reaching out from the desktop, new look at "windowing". Windows environments are becoming more than a convenient way of handling the user interface. Behind the scenes, the new windows environments provide the glue which can integrate a wide range of applications into a single homogeneous system. As multi-media applications hit the mainstream, this integration and interface capability will become a critical component. What are these capabilities and what are the directions for windows? How do the various windows options stack up? Is it Apple, MS-Windows, Motif, PM under OS/2, or one of the more sophisticated "desktop managers" which best fits your needs? In this comprehensive one day conference, we take a new look at windows.

9:15 - 9:30 Introduction

9:30 - 10:00 Windows behind the icons.

A look behind the presentation graphics to view the hidden potential of windows-based environments to deliver applications more effectively. What are the potential productivity gains, and what does it take to get them?

10:00 - 10:40 Application integration through windows.

Windows environments provide a variety of options for integration of applications. From access to host-based programs and local utilities such as word processing, to on-screen cut-and-paste, windows-based systems are opening new perceptions of applications integration. The potential and limitations of windows-based integration are introduced and common techniques and toolsets identified.

10:50 - 11:30 Open windows - directions in multi-media applications.

Image, full-motion video, voice - the future for user level computing. Where will this take us? How far off is personal video-conferencing? - perhaps

not as far as we think. In this session, we look at the future for windows-based systems in an increasingly multi-media world.

11:30 - 2:00 Lunch and Show Time.

Time to browse the largest display of windows-based applications and technologies assembled in Canada. Apply the theory of the morning sessions to the practice of the available products.

2:00 - 3:15 A clear view on windows.

A panel of user experts, experienced in the deployment of windows environments in live commercial applications, provide insight into the pros and cons of this technology.

3:30 - 4:30 Products and Profiles.

A comparative look at some of the commonly available windows systems and windows development tools. In a vendor neutral format, this session looks at the hot products for 1991/92 and highlights how they compare for common business applications.

Day 2, Tuesday, October 22

Title: Products and Productivity - Personal Productivity Tools for the 90s.

The role of information technology in the workplace is expanding year after year. The impact of high performance hardware, integrated personal software, and the growing dependency on the electronic corporate "memory" taking the place of the "paper jungle", are being felt by organizations of all shapes and sizes. What are the personal productivity tools for the knowledge worker of 1991? Do they actually contribute to increased productivity or are they just part of the cost of doing business. From products to productivity, this Compact Conference is for all those faced with the selection, implementation and use of personal computing in the workplace.

9:15 - 9:30 Introduction - The 15 Minute Primer in the Changing Role of IT in the Corporation.

A brief introduction to the trends and technologies which will reshape the way we use and build information sys-

tems in the 1990s and the impact this may have on our definitions and perceptions of "work".

9:30 - 10:30 Integrated Personal Software - what is it and can it really deliver a higher level of personal productivity.

The next crop of personal productivity tools goes far beyond the traditional word processor and spreadsheet combination. Live links between documents, integrated mail, fax, presentation tools and a whole new perspective on filing and finding information in the new generation of mixed media electronic filing cabinets. The technology promises a whole new ball game - but can it deliver? Can users capitalize on these new tools or are they going to be relegated to the back shelf of the electronic filing cabinet? This session identifies the issues and attempts to answer the questions around Integrated Personal Software - can it really deliver a higher level of personal productivity?

10:40 - 11:30 Platforms, Programs and Portability - Issues in Interoperability.

Lap-tops, desk-tops, note-books, and the Mac. The range of options for the electronic desktop grows year over year. From traditional word processing to multi-media stations, the range of user level functions is also increasing. In this session we look at the issues in integration. Integrating the new technologies with the existing investments in last year's model. Integrating the word processor with the range of sophisticated text tools now coming on the market - text retrieval, publishing, and integrating the growing "corporate memory" generated by this range of technologies into a consistent and accessible reference base. For users faced with the realities of rapid technology expansion in the office, this session is a must.

11:30 - 2:00 Lunch and Show Time.

Time to browse. View the range of integrated desktop tools and supporting products on display in the Canadian Computer Show, the largest display of personal productivity information technology assembled in Canada.

2:00 - 3:15 Personal Productivity Tools in Action.

Are you a key player, or just a spectator?

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Conferences - Continued

A panel of managers and consultants responsible for delivering tangible productivity improvements through the application of technology discuss their experiences with the current crop of personal productivity tools. From small, well-defined "work groups" to enterprise-wide IT standards, the experience of the panel will provide valuable insight into the realities of applying these technologies.

3:30 - 4:30 Products and Profiles.

This session looks at a number of the commonly available integrated personal productivity tools. These will include products for PCs, for OS/2s and for the Mac. The session will conclude with a brief look at what the future holds for the integrated desktop.

Day 3, Wednesday October 23

Title: Growing the Network - From LANs to the Enterprise...and Beyond! The push towards enterprise-wide information networks is gaining momentum. Integrated communications networks will form the basis for this infrastructure. How will today's LANs fit with the wider integrated network? What is the changing profile of WANs and the impact of the new wave of communications options? And beyond the enterprise borders, what impact will EDI and the expanded electronic universe have on corporate network strategies? In a condensed one-day forum, we explore the issues, trends, technologies and products affecting enterprise-wide networking and beyond.

9:15 - 9:30 Introduction.

9:30 - 10:30 The integrated network - the architectures and issues in enterprise-wide information systems.

The session reviews the concept of the enterprise-wide system. The changing perception of data is examined and the needs of the newer data types such as image, are introduced. Issues in the integration of established LANs, WANs and other communication systems, with multi-platform applications processors, are identified. The session concludes with a look at the characteristics required for an effective enterprise-wide network architecture.

10:40 - 11:30 Networking beyond the enterprise - EDI.

This session introduces the trends and

technologies developing around cooperative processing between organizations. The potential impacts on network planning and application integration are identified. The growing importance of EDI and the enabling technologies driving this growth are discussed.

11:30 - 2:00 Lunch and Show Time.

Time to browse the largest display of network-based applications and technologies assembled in Canada. Apply the theory of the morning sessions to the practice of the available products.

2:00 - 3:15 Enterprise networks in action.

With a focus on the real life planning, installation and support of enterprise-wide networks, a panel of user experts, provides insight based on their own recent experiences. From small companies to nationally distributed organizations, their experience provides a valuable perspective to the expectations and reality of enterprise-wide systems.

3:30 - 4:30 Products and Profiles.

This session introduces and compares the major product families supporting enterprise-wide networks, from communications-based backbones to enterprise-side extensions of traditional data processing network alternatives. In addition, some high-profile products which are facilitating the integration of mixed system architectures are profiled. These include bridges, routers and sophisticated gateway technologies. Experts in the common LAN products including Novell, Banyan, LAN Manager and Ethernet will also be on hand to answer questions.

Day 4, Thursday, October 24

Title: The one-day cram course in document image management. Document image management is becoming a strategic component in today's information systems. This one-day cram course introduces the key elements in both the development of the business case and the capabilities of the technologies. For managers, planners, technologists and affected users, this forum offers a concentrated yet comprehensive view of this important topic.

9:15 - 9:30 Introduction plus The 10-Minute Primer in Document Image Management. In a brief introductory session, we introduce the concepts and terminology of this new area of busi-

ness automation.

9:30 - 10:30 Document Image Management: The Business Case.

How do you justify getting into document image management? What are the real paybacks, the effort, the exposure? How do you identify just where to get started? This session guides you through the development of the business case to evaluate possible applications of electronic document image management. The session draws upon live examples from major government and private sector projects.

10:40 - 11:30 Image Application Architectures and Technologies.

After several years of development, announcements and pilot projects, what have we found? What are the practical architectures for electronic document image management? What are the practical technologies for today and where are they going? From storage and networking, to multi-media workstations, this session offers a condensed workshop on the key trends in document imaging.

11:30 - 2:00 Lunch and Show Time.

Time to browse the largest display of document imaging technology assembled in Canada. Solutions from the industries leading vendors will be available for demonstration in the largest product demo facility in the country. Apply the theory of the morning sessions to the practice of the available products.

2:00 - 3:15 Document imaging in action.

Live document imaging installations are still not an everyday occurrence. A panel consisting of users with operating image systems in a variety of financial and other lines of business applications will describe their experiences in planning and installing their systems. In addition, the panel may provide insight into the real costs and benefits of both the technology and its suppliers. This will be an important session for managers and technologists faced with the trials and tribulations of this new challenge.

3:30 - 4:30 Products and Profiles.

This session introduces and compares the major groups of offerings available in the market. From PC-based optical filing, through the offerings in departmental Line-of-Business systems, to the enterprise-wide platforms, we look at the products, the vendors, the successes and the setbacks.△

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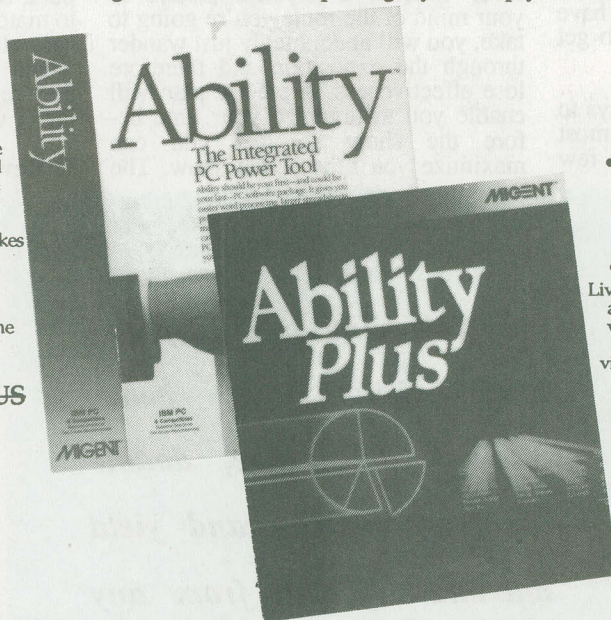
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Tips for Trade Show Visitors: How to Gain Greater Results from an Exposition

As manager of Canada's first and largest computer trade show, I have watched hundreds of thousands of people - from junior to top executives - walk through a range of expositions. They all have their own browsing styles, their own negotiating techniques and their own reasons for attending. Regardless, they do have one thing in common: a desire to get something out of the show.

There are a number of proven ways to ensure benefit from and make the most of a trade show. By following a few guidelines, visitors can better manage their time, double their productivity and yield maximum return from any exposition they attend.

1. Do your homework well in advance. Up to three months before the show, start jotting down needs, questions or problems you identify in the workplace that could relate to the show. Ask your co-workers for their input as well. This will allow you to set tangible objectives which will make your show visit more manageable and successful. The next step is to do preliminary research into the products and services you believe may help you and into the companies that provide them. An effective and time-efficient way to gather this information is through the show industry's major trade publications, which can refer you to current articles on topics matching your questions. Many shows also produce a pre-show guide - usually published one month in advance - which is key in your research. This pre-show homework will help you make more informed decisions at the show. It is particularly important for more technical trade shows, such as computer and high-technology shows, where products and systems are continually changing.

2. Set objectives. Identify what you aim to accomplish at the show. Setting objectives will not only assist in plotting a precise strategy, but it will also keep you motivated and enthusiastic throughout the course of the day. If

you keep your show goals in mind at all times, you will avoid being distracted and wasting time and will be successful in accomplishing what you set out to do.

3. Develop your route the day before. Without a physical picture in your mind of the route you're going to take, you will undoubtedly just wander through the exposition and therefore lose effectiveness. A precise plan will enable you to organize your time before the show so that you can maximize your time at the show. The

"By following a few guidelines, visitors can better manage their time, double their productivity and yield maximum return from any exposition they attend."

day before, study the pre-show guide and highlight products or programs of interest to you, along with the booth number. Determine who you want to talk to and the questions you want to ask. Then refer to the floor plan and map out a route for yourself that makes the most geographic sense, plotting specific times of where you want to be when. And be realistic; if you have a major project that should take two days to research, don't allot yourself only four hours.

4. Start by scanning. Rather than rushing through the trade show doors to delve into your plan, get oriented with the show first. Take the time to scan the booths - without talking to the exhibitors - and see what's there from

afar. This will confirm that what you're looking for is available and might even add to your original "wish list", which ultimately will save you time later on. As well, you can use this time to study show guide systems on site. For example, the Canadian Computer Show colour-codes the carpeting to match the show guide floor plan and has electronic show guides on-site which allow visitors to key in what they're looking for and receive a listing or where to find it.

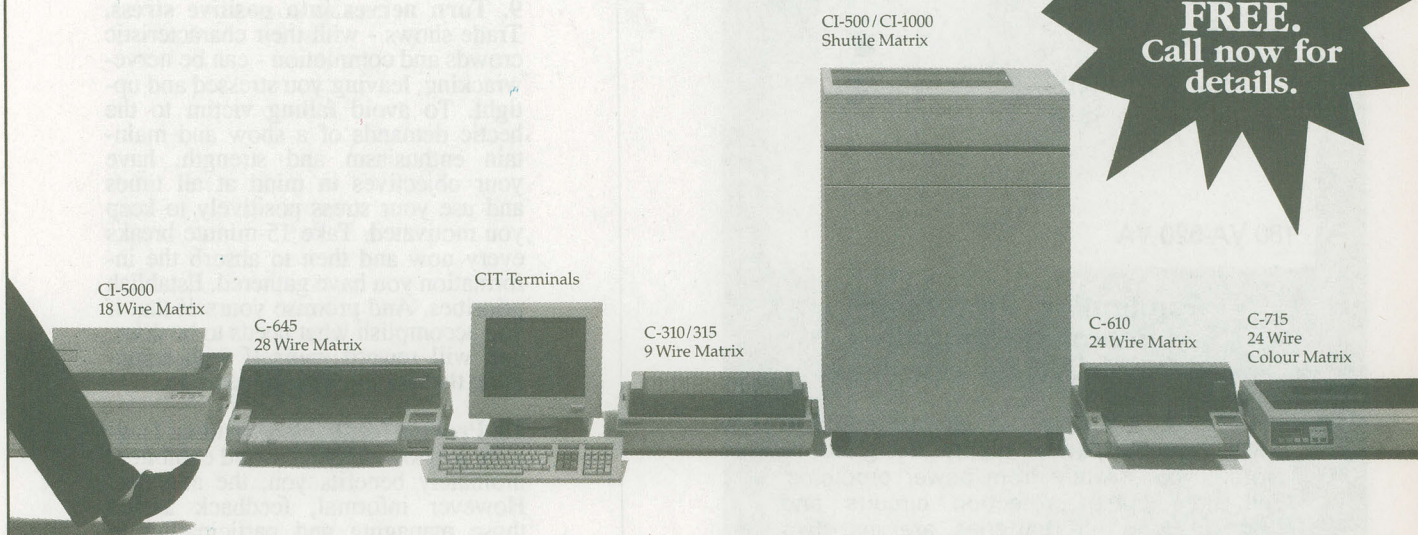
5. Review plan just before making your rounds. Once you have scanned the exposition, take time to review your plan and the questions you want to ask. Revise them if necessary and ensure your strategy is realistic. Visiting too many booths may leave you confused and unfocused, which inevitably will lessen the impact of your plan.

6. Ask questions, be upfront. To avoid wasting your time (and the time of the exhibitors) and to get honest answers, be straightforward with your questions. Tell the exhibitor pointedly what your problem is, and ask how it can be solved and how that particular company handles it. Make it very clear, very quickly. Don't be afraid to probe and ask the same question more than once, rewording it to fit the situation. This will encourage expanded answers and will give you more detailed information, flushing out the facts needed to make a decision to buy. If desired, get second opinions: ask to speak to the product specialist or technical manager. And be prepared to discuss your financial parameters.

7. Don't overload on handout material. Remember to keep your goal in mind at all times and weigh the worth of every brochure, business card or give-away you are offered. Overloading on hand-outs will cause you to get off track. Ask yourself: "Do I have a need for this information?" "Will it help me achieve my goal?" and "What will I most likely do with it after the

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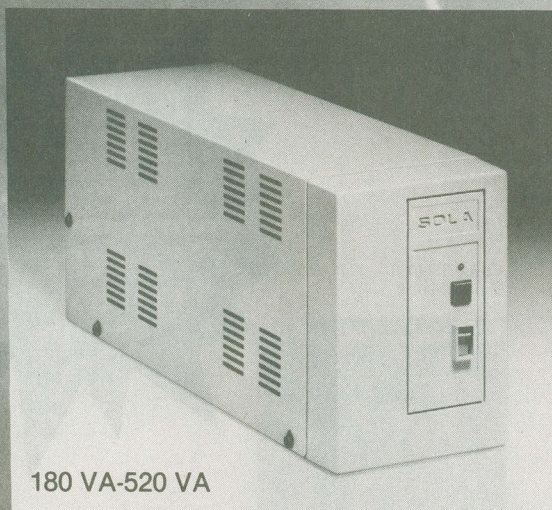
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show?" If your answers are not positive, chances are you're better off and less burdened without the material. It is not rude to say "no" and it doesn't make sense to say "yes" without reason. If you're not sure, take a business card; you can always call for the information later.

8. Take notes. To make the most of the hand-out material you do select, write brief notes on the products or services and some of the key points the representatives make. Note-taking is important because you will visit so many exhibits during the course of the day that you probably won't remember all of them or what was said, especially if you don't review the materials until days or weeks later. Useful tools for note-taking are paper clips and small note paper or "post-it notes" with an adhesive strip, which you can attach directly onto the material. Notes will also help you discuss key items with co-workers following the show.

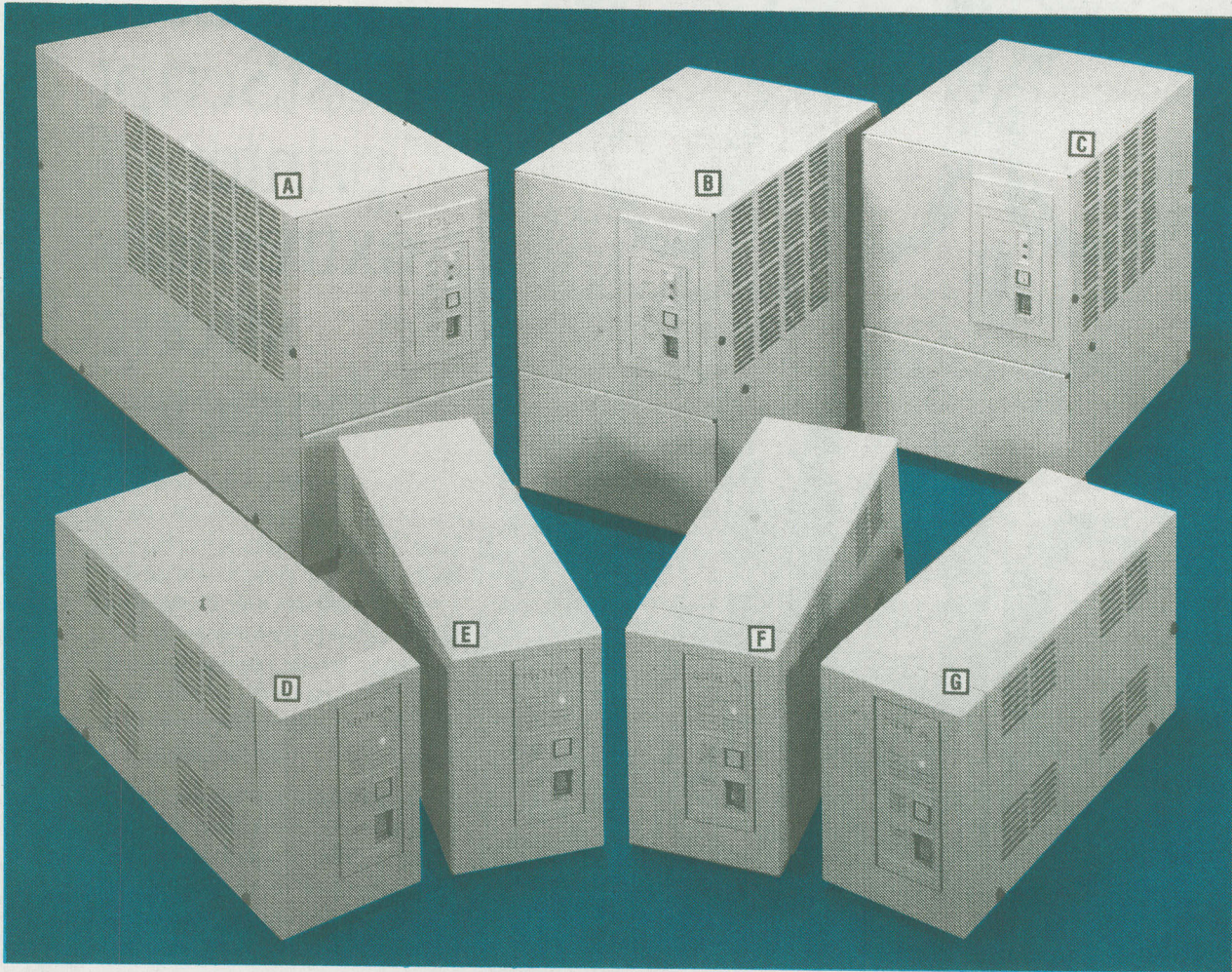
9. Turn nerves into positive stress. Trade shows - with their characteristic crowds and commotion - can be nerve-racking, leaving you stressed and uptight. To avoid falling victim to the hectic demands of a show and maintain enthusiasm and strength, have your objectives in mind at all times and use your stress positively to keep you motivated. Take 15-minute breaks every now and then to absorb the information you have gathered. Establish priorities. And promise yourself that if you accomplish what needs to be done, you will reward yourself with something that is more enjoyable to do.

10. Provide feedback. Providing feedback to show organizers and exhibitors ultimately benefits you, the attendee. However informal, feedback assists those managing and participating in the trade show to better meet visitors' needs by helping to structure the next show. Show managers and exhibitors are generally open to and welcome comments; after all, it's for the visitors that they're organizing or participating in the exposition and, like you, they too want you to get something out of the show.

Robert Grainger is a Group Show Manager of the Canadian Computer Show and Conference, Canada's largest and North America's oldest computer show, managed and produced by Industrial Trade & Consumer Shows Inc. The show runs this year from October 21 to 24, 10:00 am to 6:00 pm daily, at the International Centre in Mississauga. Δ

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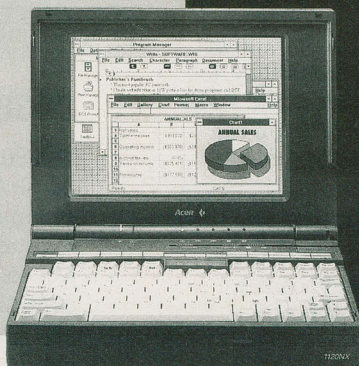
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Based on Intel's powerful 20 MHz 386SX microprocessor, the 1120NX comes in a small 11-inch by 8.5-inch by 2-inch package that fits in a briefcase, leaving room to spare. With a handle that doubles as a tilting stand for easier typing, the 1120NX is a breeze to tote anywhere. But portability doesn't mean a sacrifice in functionality. Its 10-inch triple supertwist VGA display is one of the largest and clearest. And with its 86/87-key keyboard, double keystrokes are a thing of the past.

The 1120NX offers upgrade features that will protect your notebook investment. You can expand system memory up to 5 MB using easy-to-install RAM cards. Or plug in a 80387SX coprocessor to make short work of sophisticated spreadsheets, account profiles, and more. With up to 60 MB of hard disk storage, your briefcase will never again be weighed down by excess paper work.

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The 3300 Notebook Computer is a light-weight, compact-sized 33MHz 80386DX-based personal system which can run on battery or AC power. Its incorporation of 32KB cache memory (SRAM), one of its remarkable features, enables the system to run much faster than its regular CPU speed of 33 MHz. In addition to the 32K SRAM, it comes standard with a 19ms 2½" 20 MB fixed disk drive, upgradable to 40 or 60 MB, a 3½" floppy diskette drive, a keyboard with a built-in numeric keypad, a VGA compatible CCFT backlit LCD display and 2 MB of on-board DRAM.

The screen which features high resolution can display 25 lines by 80 characters of text and 640 by 480 pixel resolution graphics in 32 grey scales. The 2 MB RAM can be expanded to 4 MB or 16 MB and can support LIM 4.0 EMS.

The Intel 80387-33 math coprocessor can be added to the system to enhance its number-crunching capabilities. For connectivity, the system has seven external ports to connect an external keyboard, a 5¼" floppy diskette drive, an external analog monitor, a parallel printer, a serial device, the numeric keypad and the optional docking station.



Review: Ultinet 3300 Notebook Computer

by E&TT Staff

80386DX Microprocessor

The 80386DX, the key working part of the 3300, is a 32-bit CPU which features 32-bit wide internal and external data paths and eight general-purpose 32-bit registers. The 80386DX microprocessor is 100% object code compatible with the 80386SX, 80286 and 8086 microprocessors.

Pipelined architecture enables the 80386DX to perform instruction fetching, decoding, execution, and memory management functions in parallel. The six independent units that make up the 80386DX pipeline are: Bus Interface Unit, Code Prefetch Unit, Instruction Decode Unit, Execution Unit, Segmentation Unit and Paging Unit. Because the 80386DX prefetches instructions and queues them internally, instruction fetch and decode times are absorbed in the pipeline; the processor rarely has to wait for an instruction to execute.

One unique feature of the 80386DX is its inclusion of the memory management unit (MMU) in the on-chip pipeline. By performing memory management on-chip, the 80386DX eliminates the serious access delays typical of implementations that use off-chip memory management units.

80387-33 Math Coprocessor

The Ultinet 3300 system design allows for the addition of a math

see Ultinet, page 13

Success, *cont'd from page 3*

add-ons that can be purchased from third-party vendors.

One of the best features of our notebooks is Auto-resume, which enables you to turn the notebook off without exiting the software. After turning the power back on, you automatically return to the same program without having lost any data. The Auto-resume on our notebooks has a lapse time of up to three weeks, compared to only two days for the two to three other manufacturers who offer this feature.

As well as saving time not having to re-boot, auto-resume is an important power-saving feature for the user.

We've adopted a couple of other features designed to keep users up and running for as long as possible.

With the Panasonic 386SX notebook (model CF-370) for example, you can set functions that automatically switch off the hard drive, floppy drive, serial port and modem, drive controller and even the whole computer after a period of activity — all for the sake of conserving battery power.

The CF-370 has a battery life of 2 hours on just 4 hours charge time, one of the best usage to charge ratios currently available.

Other areas where we feel we've surpassed customer expectations includes our introduction earlier in the year of the world's first 16 MHz 286-based notebook computer. And more recently, the decision to make 60 MB hard-drives standard on our CF-370 model—even though there's currently a world shortage of these drives.

Surpassing Customers' Expectations Tomorrow

As proud as we are of the competitive advantages of our machines today, we recognize it is only a matter of time before other manufacturers follow suit.

To keep up with the competition and wherever possible, to get ahead, we're currently conducting extensive research into the technology (e.g. screen, battery, I/C's) that's crucial to building a better portable computer.

If Panasonic has an advantage over the competition, it's the fact that we manufacture most of our own components. This enables us to have greater control over the quality of the product, it makes us less susceptible to component shortages and in instances where the demand is jus-

tified, will enable us to introduce new technology sooner.

In the short term, we expect this will give us a 3-4 month lead over OEM manufacturers — who rely on companies like Matsushita for their components.

Over the long term however, we realize technology will filter down, at which point the successful vendor will be the one that can offer the most features for the lowest price.

The companies that survive this "shakeout" will be the one's that can do this on a consistent basis. And the winners, any way you look at it, will be you, the customer. □



THE UNIVERSAL NOTEBOOK CASE

Targus introduces the new Universal Notebook Case. The case is made of an innovative new material that is both stylish and durable and features two individual padded compartments that measure 11"x13"x2.5". The computer compartment has an extra layer of foam padding and two velcro straps to secure the computer. The other compartment features velcro adjustable dividers to fit power-supplies, A.C. adaptors, and external disk drives or keypads. These dividers can be removed to accommodate a personal printer or to be used as a briefcase.

The case also features a detachable shoulder strap, disk pockets and pen and business card holders, and two external pockets that will hold 8.5"x11" folders.

The Universal Notebook Case is designed to fit all the popular models of notebook computers including the Toshiba T1000/1100/1200XE/2000SX, Compaq LTE 286/386, Everex Tempo, Librex 286/386, NEC Ultralite, Packard Bell 286NB, Sharp 6220, and the Zenith Minisport.

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Well I can't surprise anyone with a Unix laptop any more, but I am sure some eyebrows will rise when I tell you that the Unix Notebook is now available. To be totally honest, I am having great difficulty appreciating all that power in a Notebook. At least the laptop looks like a computer, feels like a computer, and will not look ridiculous when connected with external peripherals, or when used with a 19" monochrome display.

This is true whether we are talking about the Sony News 3250 (MIPS chip) or the RDI Brite Lite Trigem SLT100 (SPARC chip). Each laptop is meant to be a regular workstation, with standard configuration (8 Mbytes RAM, 200MB hard disk). However, and this is a big **HOWEVER**, for use with significant software like FrameMaker (with all the fonts you would want to use), 200 MB is kind of skimpy. The current hard disk technology suggests 400MB to 500MB in the 3.5 inch format will be adopted by any Unix laptop (and workstation) manufacturer, and some should be appearing as you read this.

On the display side of the technology (critical component from GUI to why you bought a workstation in the first place), the *de facto* standard resolution 1,152 x 900 (low resolution) is supported.

Unfortunately, some U.S. based writers tested and evaluated sub-standard configurations (first release of Brite Lite and Trigem SLT100 used a 640 x 480 VGA-like resolution), then bravely submitted articles suggesting the use of such systems was not desirable. No kidding!

Processing power is the next level (I know you have to start with the application software first, but I'm the one writing, remember). At a low speed of 15 mips, we have surpassed some 80486 systems in power, so my assumption is: 15 or more is more than I need. This is further evidenced by the fact that my laptop will not become a server, but rather a client. Some heavy-duty graphics packages can really use the extra processing power though, so some of us may have a right to complain about a slow 15 mip machine.

Should you care about the underlying architecture? Folks, this is where we separate the men from the boys. You can buy a MIPS RISC, a Motorola RISC, or a SPARC RISC. This is where the software comes in. Has the application software been ported to the architecture? If the answer is yes, then you can start to feel comfortable. If the answer is no, then a warning flag should appear in your mind. Your architectural selection will also affect the peripherals you choose to add to your laptop, and, this is not funny; how much is it going to cost. That being said, a

The New Breed

by Guy Michaud (Epson Canada)

proprietary RISC will point to higher prices, and a market-driven RISC (Sparc) will continue to reduce them.

There is a happy medium between laptops and full-fledged regular workstations, and they are called Transportables. An example is the recently announced Solbourne S3000. This machine behaves completely like a workstation, equal in power, disk space, memory, and screen resolution. The price is closer to workstation market prices **PLUS**. Portability has its costs.

Should anyone think the above is sufficient, let me assure you that this portable Unix market has only begun. There will be more laptops, notebooks, and transportables. What does it all mean? It means that Unix is spreading into the last frontier of computing. And really, how many operating systems can claim a presence from Notebook to mainframe? From there, we could extrapolate that, within a short time, a lot of people are going to be touched by Unix. I will also boldly add that, DOS which was once considered a cheap clone of Unix, may suddenly only be known as an emulation under Unix.

The crystal ball is interestingly accurate, when you find out who is trying to do what to who. History in computers is as intriguing as its future, however. When you look up the origins of networks, ethernet, or centralized processing concepts, it's hard to believe these beginning (working) elements were present as early as 1963. It just so happens that data can be pushed around at a much greater speed now, which explains our thirst for increased processor performance. The tightrope the industry has been walking on has been made less susceptible to unexpected vibrations, in that a competitive industry has evolved (DOS), and is expanding (RISC/SPARC Unix).

So while we enjoy the current state-of-the-art Solbournes, RDIs and Suns, we can feel comfortable that upgrading will not be an issue, and that we are not alone. Hail Open Systems!

For more information contact Epson Canada Limited, 95 Mural Street, Suite 600, Richmond Hill, Ontario L4B 3G3, Tel: (416) 881-9955, Fax: (416) 881-1831. □

Ultinet, *Cont'd from page 10*

coprocessor. The math coprocessor which the system can accept is the Intel 80387-33. The 80387-33 expands the 80386DX's numeric processing ability with its special functions. It adds trigonometric, logarithmic, exponential and arithmetic instructions to the 80386DX instruction set. The 80387-33 presents itself as a complete solution for high-performance numeric processing applications.

The Display

The 3300's display is a VGA-compatible CCFT backlit flat-panel LCD screen which is driven by Cirrus Logic CL-GD 610/620 VGA controller and has a 9-inch diagonal viewing area. You can tilt it to any angle from 0 to 130 degrees. To attain the optimum level of readability, you can adjust contrast and brightness via the display controls positioned on the right panel.

The Keyboard

The system comes with an 81/83 key AT-compatible keyboard. Although the keyboard layout is different from that of an IBM AT keyboard, it offers almost the same functions as the latter does. Special features which distinguish it from an AT keyboard include an integrated numeric keypad and multi-function keys. The Ultinet 3300 Notebook Computer is offered at a special introductory price of \$2,900.

All in all the Ultinet 3300 Notebook Computer is a fine machine, light, portable, and just as powerful as any full-featured '386'. For more informa-

tion contact: Ultinet Computer Systems, 3200 Dufferin St., Unit 1B, Toronto M6A 2T3 Tel: (416) 256-2000 Fax: (416) 256-1449 □

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- A-6200H — This is a 286-based laptop computer with a paper white EGA LCD display and 40MB hard disk drive. It is the low-end portable computer in the family and ideal for beginners.
- A9200V — This is an 386SX laptop computer with a VGA gas plasma display. The computer is also equipped with a 40MB hard disk drive and an 8-bit ISA slot for expansion.
- A9400H — This is the top line of the family based on a 386DX processor running at 20MHz. It is equipped with a 100MB hard disk drive and two ISA slots (8-bit & 16-bit) for expansion.

CAF SuperLITE Notebook Series

The CAF notebook computer has just won the No.1 Award for Excellence in Computer products design in Taiwan. It also rates the best in price/performance among others in the PC magazine recently published in Germany.

The CAF SuperLITE 286 runs at 16 MHz. The paper white VGA LCD display and 20MB or 40MB hard disk drive provide low cost and high performance running Windows, spreadsheet and word processor applications.

The CAF SuperLITE 386SX is based on a 20MHz processor. It also has a paper white VGA LCD display, 40MB or 60MB hard disk drive and 3MB standard RAM in the system.

Lapplus: The Name of Quality Laptops

by E&TT Staff

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There's much talk these days over whether it's safe to work in front of a computer for long periods of time. Several current studies conclude that there may be danger in prolonged exposure to Video Display Terminal (VDT) radiation. Other research fails to substantiate it. Still more studies are planned, to try to settle this question.

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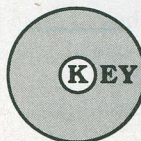


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The Sony CPD-1304 makes one appreciate what a dead waste using Trinitron picture tubes in television sets really is. The relatively low picture quality of broadcast video at the best of times — really doesn't do justice to what a Trinitron tube can properly display. All things being considered, they're a lot better suited to computer displays than to the viewing of commercials for other colour television sets.

As VGA cards have become the standard display device for personal computers, a lot of pretty dreadful low end monitors have appeared. When looking for a computer, people rarely consider the tube they'll be getting until long after it starts making their eyes water.

The Sony CPD-1304 is a very good monitor. By virtue of its superior picture tube and also because its electronics have been designed to make it a high end computer monitor — not a reworked colour television — it produces a sharp, stable display in all the modes it supports. It doesn't go into rumbling hiccups every time you switch modes and it doesn't suffer a partial seizure if you leave it on for eight hours at a stretch.

Finally, it doesn't weigh in at more than most computer users do and it's reasonably compact, something which can't be said of the majority of display devices.

The Sony CPD-1304 is a fourteen inch display, which is a comfortable size for most of the things people do with personal computers. While there's a trend of sorts toward really enormous monitors — mostly for desktop publishing and spreadsheets — a large screen is uncomfortable to use if you sit right in front of your machine.

The CPD-1304's screen is a black glass Trinitron tube. While it's not etched, the black glass drinks reflections and glare pretty respectably, and doesn't degrade the image resolution as an etched surface can. The display looks crisp and readable even if you use it under fluorescent brain sterilization lamps.

It has a twenty-six millimetre dot pitch, which produces a very tight display.

The CPD-1304 has front-mounted brightness and contrast controls and a front-mounted power switch, which is a mercy. Its image size adjustment controls are mounted on the side, which makes them reasonably easy to get at.

The tilt swivel base of the CPD-1304 is somewhat more intelligently designed than many. It allows forty-five degrees of horizontal motion in either direction and thirteen degrees of vertical movement. This means that you can adjust the angle of the monitor for reasonable viewing, but that it doesn't go for a spin if someone bumps into it.

The CPD-1304 will display graphics up to 1024 by 768 pixels, which makes it suitable for use with pret-

Sony CPD-1304 Monitor

by Steve Rimmer

ty well any super-VGA card you want to connect to it. It has a very stable display even at high resolutions, and it switches modes as cleanly as any monitor I've ever encountered.

One of the fairly impressive aspects of the CPD-1304's mode switching is that the image doesn't change size, even through display modes of vastly different characteristics. You can switch from forty column text to an eight hundred pixel wide, 256-colour graphic without the display having shifted noticeably. The CPD-1304 can also handle the new "ergonomic" seventy-two hertz super-VGA displays.

The Tube

The CPD-1304 is one of the simplest monitors to install. If you'll be using it with a super-VGA card you can simply unpack it, plug it in and get to work. The one I got even had the brightness and contrast controls set correctly as it came out of the box.

It's curious to look at the CPD-1304 for a while if you've been using a non-Trinitron monitor for some time. Conventional monitors have a somewhat convex screen, giving their images a slight case of pin-cushion distortion. In time, your eye will compensate for this until you don't notice it. It becomes apparent if you attempt to take a photograph of a screen display.

The Trinitron tube has a screen which has no vertical curvature and a slight convex horizontal one. This preserves the characteristic which picture tubes have of allowing you to view them comfortably even if you're slightly to the side of the screen, but it eliminates the slight distortion of a conventional monitor.

The Sony CPD-1304 is one of the best monitors I've had the opportunity to try in a long while. Its image quality is superb, its mode switching and syncing flawless and it's light enough to be moved without a winch if you have to get at the insides of your computer.

The Sony CPD-1304 has a list price of \$995. For more information contact Sony of Canada Ltd., 405 Gordon Baker Rd., Willowdale, Ontario M2H 2S6 Tel: (416) 499-1414. □

Established almost 14 months ago, Keynet Distributors Canada Inc., the official distributors of Copam monitors, has been providing customers with ready solutions for any office computing requirement. Located in Mississauga, Ontario, the company delivers quality product with quality service.

"One of the biggest problems we faced was overall support in the industry, especially when it came to compatibility," recalls Jack Chandarana, President of Keynet. "The way to correct this was a total solution by way of total distribution. By working closely with the dealers — listening to them and helping them with their problems — we can help to provide a total solution with few down time hours for the customer. The dealer then is not just getting support but teamwork as well."

Stemming from this commitment to high quality support, Keynet delivers high quality product as well.

The Copam 1400-30R Monitor is designed not only for ergonomic performance and easy user operation, but also for something which is becoming increasingly important and vital to our health. The 1400-30LR is designed with low radiation performance.

Meeting the Swedish National Institute of Radiation Protection standards, the monitor is designed for use in offices today and tomorrow. Video Display Terminal (VDT) or Monitor radiation has become a hot topic in this age of office health risks. Keynet delivers a monitor meeting strict guidelines for reducing harmful radiation.

"Currently, radiation comes out from all sides on standard monitors," explains Kim Fletcher, Sales Manager. "People usually think that the radiation comes from the screen facing the user. But in fact the radiation is much more powerful coming out of the back of the monitor and can be dangerous to a co-worker working opposite to you."

The nature of the Very Low Frequency and Extremely Low Frequency radiation emitted by VDTs is such that, unlike higher frequency electromagnetic waves, it can't be blocked by simply shielding the deflection yoke. This kind of radiation passes right

Copam, cont'd. from page 3

netic radiation might be escaping it in the process.

In use, the Copam 1400-30LR is a stable, flexible display which can be looked at for extended periods without eye strain. It handles switching between Windows in graphics mode and DOS in text mode effortlessly, and without any undue screen dances.

No Hazards

If the health issues surrounding monitors concern you, the Copam can be thought of as cheap in-

Copam Establishes New Inroads

By Electronics & Technology Today Staff

through metal — even lead — as well as walls, floors, and human bodies. To combat this problem, Copam, the monitor manufacturer, uses a design to effectively cancel out the radiation.

In theory, a magnetic field can be cancelled out by deliberately creating a second field of exactly the same size, shape and location, 180 degrees out of phase with the first field. This means that while the first field is expanding, the second field is collapsing, and vice-versa. The end result is that there is no magnetic field at all. In practice, the two fields will not be precisely identical, so some small amount of magnetic radiation will still exist — but only an insignificant amount, not enough to worry about.

"The next step for monitors will be co-processed video," foretells Kim Fletcher. "Users will want to get the computer image onto the screen quicker than they can today. Low radiation standards will become accepted for all computer manufacturers. We will also see docking stations for laptops at the user's desk area. Tighter integration of the working computer and the monitor will also be important. Anti-glare which is a standard feature of the Copam monitors will also be a common element of other manufacturers' monitors."

With many people concerned about the health risks in the office environment, low radiation monitors can provide a solution to this problem. Keynet Distributors Canada Inc., the official distributors of the Copam monitors, can deliver high-quality monitors with low-radiation results. □
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surance. If electromagnetic radiation turns out not to be an issue, the Copam is still a good monitor for business applications at a competitive price.

In a world full of things that seem bent on your destruction, you might regard a monitor such as the 1400-30LR as a good way to eliminate one of them. For more information contact: Keynet Distributors Canada Inc., 1885 Meyerside Drive, Unit #1, Mississauga, Ont., L5T 1G7 Tel: (416) 798-7742 Fax: (416) 670-0004 □

The remarkable things about the Darius are its low price and high quality. This may be the monitor bargain of the year.

The Darius HRV-1024 is notable in that it is a high-quality, inexpensive and light-weight product. The Darius HRV-1024 displays solid, stable images of everything from 80 by 25 character text right on out to 1024 by 768, 256-colour graphics. Unencumbered by complex controls, it's arguably an ideal monitor. Its operation is simple, enjoyable and trouble-free.

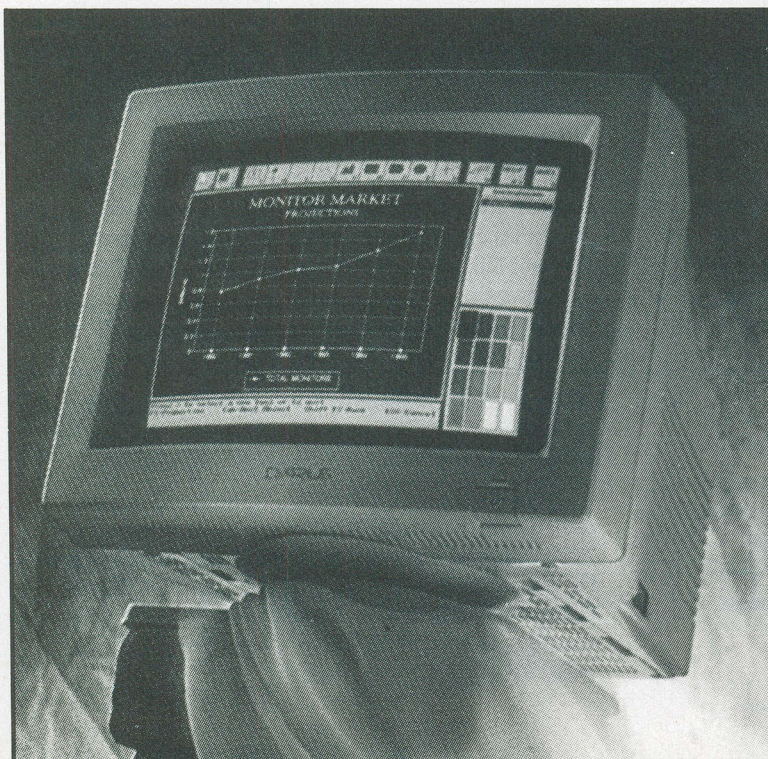
The Darius doesn't seem to need the programmable features of more expensive display hardware — in fact, it doesn't even miss them. It lets you get on with your work.

The biggest issue involved in installing one is what to do with the packing carton afterwards, a problem common to all computer hardware.

The Darius is manufactured in Korea, to American specifications and has a list price of \$410.00.

Untroubled Performance

You can install a Darius monitor with no tools, no setting up and no recourse to its thin manual. Plug it in and turn on your computer.



The Darius HRV-1024 Super VGA Monitor

by Arthur Bear

The Darius is a good choice in display hardware for applications which are weighted towards text mode screens and sixteen-colour business mode graphics, such as Microsoft Windows. It produces stable Windows displays out to 800 by 600 pixels with virtually no change in aspect ratio and no image distortion. It's equally solid when confronted with a 640 by 480 pixel, 256-colour graphic.

When asked to display a 1024 by 768 pixel, 256-colour image, the Darius syncs without any difficulty and is stable in this mode — something which cannot be said of many other monitors.

The Darius is based on a .28 millimetre dot pitch picture tube with an etched glass, non-glare surface. It's comfortable to watch even if you stare at your monitor for hours. It has no annoying visible flicker which seems to be a constant feature of many low-priced monitors in their graphics modes. It's also remarkably stable over time. Its colours don't shift as it warms up, for example.

The Darius will handle horizontal scan frequencies of up to 35.5 kilohertz and vertical frequencies to 90 hertz, making it suitable for use with any contemporary super VGA card.

Good Glass

The Darius HRV-1024 is a well-designed, simple monitor in which the cost of owning one pays for the hardware, rather than its name. Painless to install and use and capable of dealing with a wide range of display applications, it's a good, low-cost solution to most display problems.

For more information contact: TK-IDM Technology (Toronto) Inc., 3818 Victoria Park Ave., Scarborough, Ont. M2H 3H7
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0.5% (Best in the industry), MAC II compatible and features Auto Vertical Sizing. It's no wonder MAG Monitors were chosen Editors Choice 2 years running (1990, 1991) in PC magazine. Find out for yourself why MAG monitors are being touted as truly MAGnificent!

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RESOLUTION DISPLAY TYPE	1024 x 768 INTERLACED	1024 x 768 NON-INTERLACED	1280 x 1024 MULTI SYNC. NON-INTERLACED	1280 x 1024 MULTI SYNC. NON-INTERLACED	1280 x 1024 MULTI SYNC. NON-INTERLACED	1024 x 768 INTERLACED
FREQUENCIES HORIZONTAL VERT. (REFRESH) VIDEO BANDWIDTH	34-36 KHz 50-90 Hz 45 MHz	30/32-47/49 KHz 50-90 Hz 65 MHz	30-64 KHz 50-120 Hz 100 MHz	30-68 KHz 50-120 Hz 100 MHz	30-68 KHz 50-120 Hz 100 MHz	30-36 KHz 50-90 Hz 45 MHz
COMPATABILITY	VGA, SUPER VGA, 8514A, MAC II	VGA, VESA, SUPER VGA	VGA, SUPER VGA 8514A, VESA, MAC II	VGA, SUPER VGA 8514A, VESA, MAC II	VGA, SUPER VGA 8514A, VESA, MAC II	VGA, SUPER VGA 8514A, MAC II
OPTIONS	LOW MAGNETIC RADIATION, MAC II ADAPTER	LOW MAGNETIC RADIATION,	MAC II ADAPTER, BNC ADAPTER	MAC II ADAPTER, BNC ADAPTER	BNC ADAPTER	MAC II ADAPTER,



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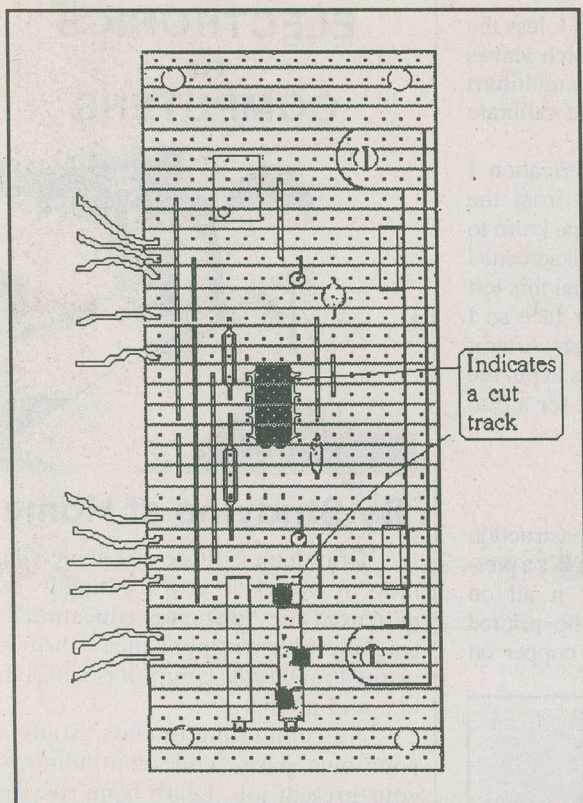


Figure 8. Rear View of Board Indicating Cut Tracks

2200 μ F of about the right physical size. I also replaced the on-board fuse with a 1.6 amp slow blow. This is pushing the capabilities of the rectifier diodes, which are rated at about 1 amp but they could easily be replaced with higher rated rectifiers. (I found when measuring the actual output of these supplies that their nominal voltage was closer to 22 volts than what was specified on the housing.)

What about a variable regulator? I could have used a similar circuit to the one on the 5 volt supply but made it variable using a potentiometer. This would have involved a fair amount of circuit construction, so I looked further. (In fact, it wouldn't be hard to buy two more of these modules and modify them to be variable, giving you a total of three independent supplies, but I wanted to keep the project relatively inexpensive.)

I decided to build two simple variable regulators using a LM317 adjustable positive regulator and a LM337 adjustable negative regulator and add an op amp circuit which would allow me to switch to a tracking type of operation.

The schematic is shown in Figure 4. Individually, the regulators use voltage dividers consisting of a 240 ohm resistor and a 5 k potentiometer to set a reference voltage on the adjust pin of the three-terminal device. Adjusting the potentiometer will give a voltage output range from 1.2 volts to about 20.5 volts.

If higher voltages were required another transformer could be used to increase the unregulated DC level. It also occurred to me that a different combination of input leads on the transformer could be connected to the 120 VAC (probably the combination for 100 VAC in). This would decrease the turns ratio thereby increasing the output of the transformer, although I haven't yet tried it...

The tracking feature of this circuit is accomplished by using an LM301 op amp to sense the level of the positive power supply, invert it and set the reference level for the negative voltage regulator. When in tracking mode, the switch disconnects the potentiometer reference and connects the output of the op amp to the regulator. Sensing the positive power supply output is done using a voltage divider made up of a 10 k resistor and a 20 k multiturn potentiometer, connected from the positive output to the negative output. Adjusting the pot allows you to match the levels very closely. The centre of the voltage divider is connected to the inverting input of the op amp while the non-inverting input is connected to ground through a 4.7 k resistor.

The op amp accomplishes its task by comparing the voltage level on the voltage divider to ground (on non-inverting input). Because the voltage divider is essentially two 10 k resistors, its output should be 0 volts. If the positive supply increases (because of adjusting the positive control pot) the inverting input will see an increased voltage. This will be inverted and amplified by the gain of

the op amp (very high because there is no feedback loop) giving a negative voltage on the op amp output. This negative voltage sets the reference for the negative voltage regulator. As the negative supply increases (in a negative direction) an equilibrium will be established.

One more circuit had to be designed before I put it all together in a working prototype — meters for the variable supplies. Again I made use of the surplus equipment available at Princess Auto by obtaining a couple of inexpensive panel meters (about eight bucks). These meters are not used. They are brand new and come in shrink wrapped packaging with some instructions on

see Basic, page 26

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Basic, *cont'd* from page 23

the back. There are several sizes, shapes and ranges but I found that most of them had scales higher than what I wanted so I had to change the series resistance to scale them differently and then change the lettering on the front of the meter.

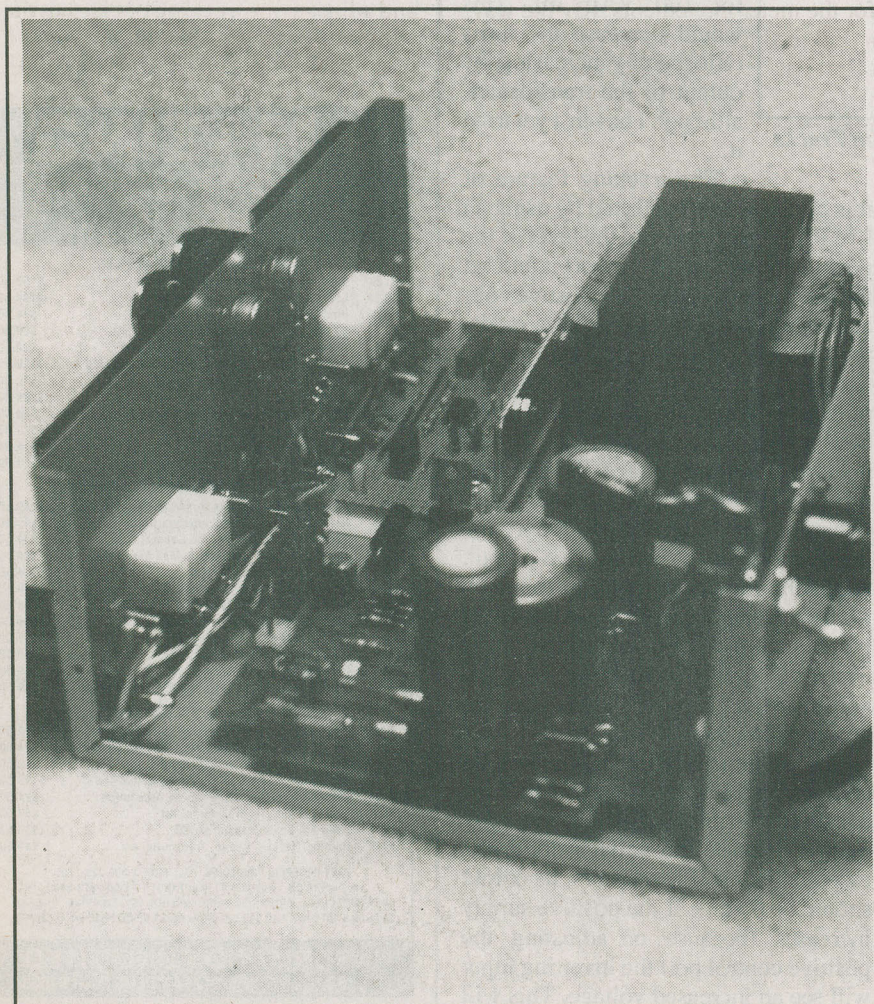
The meter movements I used were about 6 cm by 6 cm and were scaled for 0 to 75 volts DC. A 15 k precision resistor was included with each one to scale it for 75 volts full scale. With that information in mind I recalculated the resistance needed to scale them for 0 to 30 volts full scale. (See Figures 5 and 6) I used my ohmmeter to measure the resistance of the meter coil itself and found it to be very close to 1 k. With 75 volts applied and a 15 k resistor in series the full scale current would be 4.7 mA. Recalculating for 30 volts at the same current showed that I would need a

series resistance of about 6.3 k less the internal resistance of 1 k which leaves 5.3 k. I decided to use a 10 k multiturn potentiometer so that I could calibrate the meter more easily.

To finish the meter modification I removed the plastic covers from the meters and used a scalpel-type knife to carefully scrape away the silkscreened lettering on the scale. As usual this left a obvious spot on the meter face so I sprayed it with a plastic lacquer. After it dried I used Letraset transfers to put the proper numbers on the scale for a 0 to 30 volt indication.

Construction

Figures 7 and 8 show the construction details of the regulator board. It's a pretty simple circuit so I put it all on Veroboard which is phenolic printed circuit board with strips of copper on



Interior of Completed Power Supply

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one side and a grid of holes on .1 inch centres. I found an old piece of aluminum to use as a heatsink which had mounting tabs ideal for bolting it directly to the board. I mounted the regulator chips on the board and bolted them to the heatsink saving the extra wiring required to mount them off board on the power supply chassis. It is important to isolate the regulators using mica insulators and plastic washers as the tabs of the regulators are connected to pins on the chip and are at different potentials.

Besides the conductors between the pins of the op amp track had to be cut in only three places (as shown in Figure 8). Several jumpers are required to interconnect components. In addition to the tracking adjustment potentiometer, the two meter adjustment pots were mounted on the board.

Now that all the circuits were complete I went searching for the rest of the hardware required to put the project together. I obtained a metal box from

the local Radio Shack and mounted the power transformer and surplus power supply inside without its housing. One thing to note here is that the series pass transistor on the bottom of the board must be isolated from the chassis with the appropriate mica insulator. The plastic washer which extends through the hole in the transistor came with it. Always check with an ohmmeter before powering up a project like this to make sure that there is isolation.

Next I added a power switch and a fuse in the rear of the chassis. Let me warn you, as always, **BE CAREFUL** when constructing any project where 120 VAC power is used. Cover all exposed conductors which are associated with the line voltage and **ALWAYS** use a three-prong plug and line cord, connecting the green, ground wire to the chassis.

On the front of the chassis I cut holes for the meter movements. (By the way, a nibbler tool, available at most electronic suppliers including Radio

Shack, is very useful for this task.) Then I drilled holes for two control pots, a switch and five binding posts.

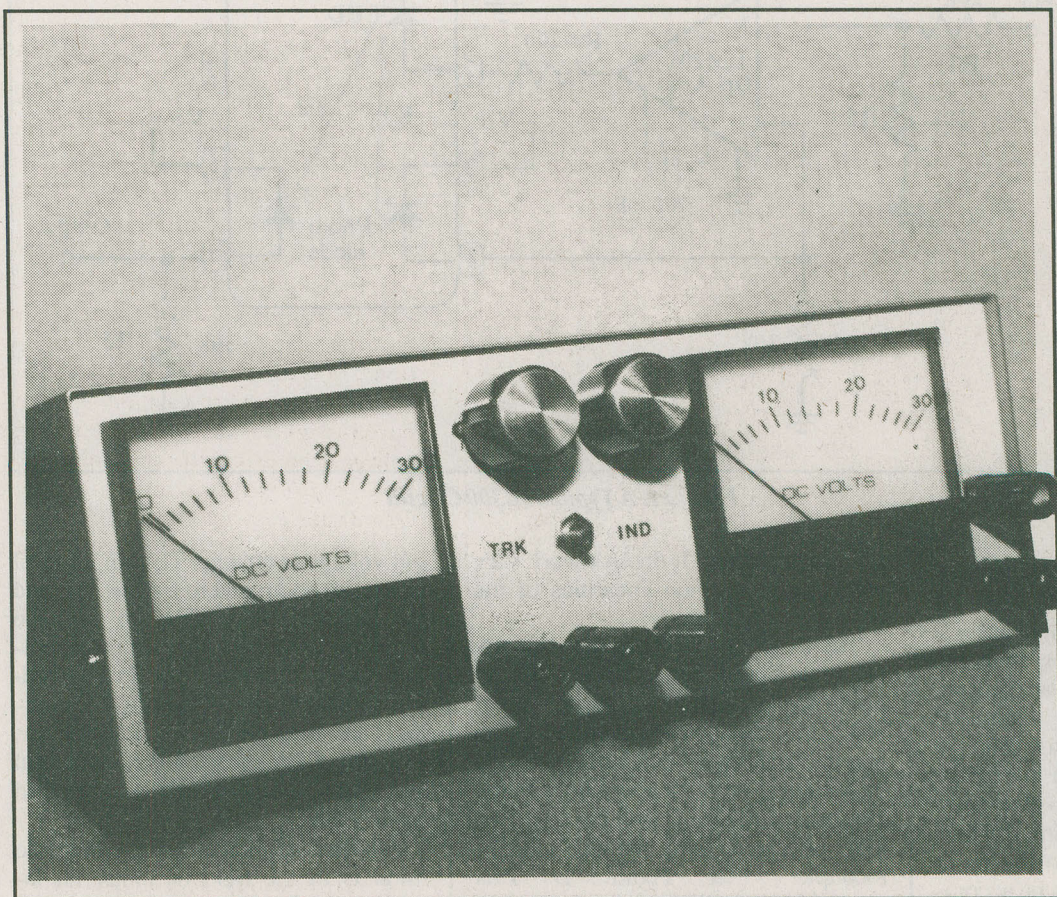
The most labour-intensive part of the job is the point to point wiring required to connect the veroboard regulator to the front panel control pots, the switch, the binding posts and the meter movements. I found a connector which would plug onto the output pins of the surplus power supply board which makes this board easily removable. As usual, care and attention to your soldering techniques will probably save you headaches later on.

Eventually the moment of truth arrived; the moment when I had to flip the power switch and hope the smoke didn't curl up out of the circuitry. To my satisfaction everything operated quite well. At least there were no catastrophes. Using my Fluke 77 again I checked the output in tracking mode and adjusted the tracking pot so that the two outputs were equal but opposite. I then adjusted the meter pots so that the meters indicated the same as my Fluke.

One note here: The meter movements were obviously not the highest quality. In addition to being fairly clunky in their response, I had some trouble getting them to retain their mechanical zero, probably due to some stickiness in their operation. Even so, they give a fairly good indication of the supply's output and, for precise adjustment another meter can be used.

All in all, Murphy seemed to help us with this one. We ended up with a pretty good supply at a reasonable cost and learned something about op amps at the same time. Moreover, we now have a supply which will be useful in future breadboarding and experimentation.

□



Completed Power Supply

Tech-niques!

by Ron C. Johnson

As most of you already know, there are lots of interesting integrated circuits available that will help you do specific tasks with a minimum of external circuitry. The trick is to be familiar enough with them to know when they can be helpful to you. Sometimes you have seen a device used in one application but may not know that it can be applied slightly differently to something you want to build. This month let's look at a fairly new chip to see how it works and to get an idea of how it can be applied.

The integrated circuit we will discuss is one that I got a sample of not long ago — an optocoupler, part number IL300G and it comes in an eight pin DIP package. Optocouplers have been around for a long time now, of course, but the interesting thing about this unit is that it is a linear optocoupler.

Most optocouplers are used to couple a switched signal from one point to the other while keeping the two sections of the circuit electrically isolated. One application is in the input circuitry of programmable logic controllers where you are sensing the condition of field contacts. Switched AC or DC voltage can be sensed and coupled through the device to a transistor, TTL logic level or other type of output. By controlling the current and voltage applied to the input side various input levels can be accommodated. An ordinary optocoupler

handles this switched type of operation with no problem; when the signal causes current to flow through the input LED, light (usually infrared) travels between the LED and an optical sensor (photodiode or phototransistor) inside the chip. This causes the output device to turn on. The problem comes in when you try to modulate, or control the analog level of the current through the input diode, hoping to get a linear varia-

used in the actual output of the device. By feeding back the output of the feedback photodiode to the input amplifier the overall response will be linearized.

An excellent application for the device is in switching power supplies where sensing the output voltage is important in controlling the switch mode regulator. In a regulator circuit the output voltage is monitored to sense if load current fluctuations are causing the out-

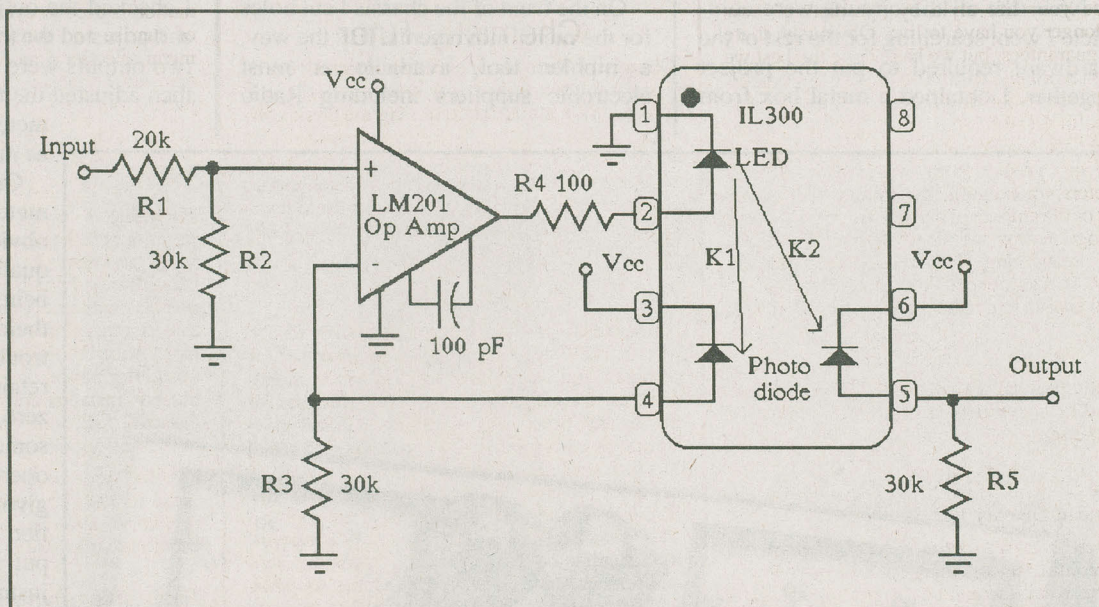


Figure 1. A Typical IL300 Circuit

tion at the output. It doesn't work very well due to the non-linearities of the devices in the chip.

The IL300G is designed specifically to couple analog signals while retaining a linear relationship between the input and output and, at the same time, to maintain electrical isolation. It does this by including an extra photodiode in the chip which can be used in the feedback loop of the op amp driving the optocoupler. (See Figure 1) This photodiode has the same transfer and temperature characteristics as the one

put voltage to change. The output level is sensed, compared to a reference, and the difference is used to tell the regulator to adjust the output accordingly. Due to the fact that, in a switching regulator, these two parts of the circuit are isolated by a transformer, isolating the feedback signal is helpful in maintaining separation between them.

Another application that comes to mind is in the field of industrial in-

see *Tech-niques* page 38

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Volume 1

Life Expectancy

LEX is intended to be an entertaining way to evaluate your life style by "predicting" how much longer you have to live. Obviously, there are no guarantees, but we have done the best we can with available data. The program is graphical, interactive (obviously) and I'd like to add very useful. In addition to providing a prediction of your life expectancy, LEX allows you to modify this prediction by changing one of the parameters, for example, the amount of red meat you eat or the amount of aerobic exercise you get. The program was written with great love by a person recovering from quadruple bypass surgery. It was created with the desire to encourage people to live long and enjoyable lives.

Eclipse

This little program calculates the date and time (forward or backwards in time) of any solar or lunar eclipse.

Gravity

Welcome to Gravity 1.0!

Have you ever wondered if planets can have stable orbits around a binary sun? Have you ever wondered what it would be like if a Jupiter-sized planet were to pass through our solar system? Perhaps you feel that life on Earth would be more fun if only our planet's orbit were not so boring. Gravity is designed to let you explore all these possibilities; it is designed to give you an intuitive feel for how a system will behave. By simply placing planets and dragging vectors you will be

able to create entire solar systems and watch them behave under the influence of gravity. This program requires Microsoft Windows 3.0.

Chemistry Tutor

Chemistry Tutor is an excellent interactive program that teaches chemistry to kids (of all ages). The program starts by explaining the basic concepts of atoms and how they combine to form molecules. The program lets you move atoms together to combine them into molecules and, at the same time, explains the rules for these combinations. A must for anyone with curious kids! Requires EGA or VGA screen.

Almanac

Almanac is a calendar/information utility for the Microsoft Windows operating environment. It provides traditional calendar displays in month and year format as well as a popup desk set for day-to-day notes and schedules. Global configuration parameters can be configured to select the face and size of the display fonts used to compose the calendar, and the position and size of the main and popup windows. Configuration files (auto-load modules) and overlays allow you to customize calendars for all of your business and personal needs. The types of events Almanac will calculate include weekly, monthly, and annual events by day or date, as well as birthdays, wedding anniversaries, and others. Up to ten overlays may be specified in a configuration file.

In addition, Almanac auto-load modules allow you to configure options for calculating religious holidays (Christian and/or Jewish), phases of the

moon, and calendar mode (Gregorian/Jewish). A location data base is used to select a geographic location for each auto-load module. This information is used to calculate the time and azimuth of sunrise and sunset for each day. All of the menu selections under 'Config' are stored in the auto-load module except the master directory path.

Psychiatric Medical Database

PsyMed is quick reference guide to the psychotropic medications. The software provides quick and easy access to over 130 medication definitions commonly needed by Mental Health professionals and others. With PsyMed you avoid the drudgery of searching through various medication books to find the medication you need information on. The information can be accessed instantaneously by various PsyMed "search" functions or by keying in a complete brand name spelling.

PsyMed provides condensed Indications, Adverse Reactions, Dosage, and Visual Identification information on all psychotropic medications contained in its' files.

Note: This program is really big, so it requires either a high density floppy drive or a hard disk to unarchive it.

\$24.95 (Two Disk Set)

Volume 2

AMPTOOLS

Amptools is a wonderfully designed, easy to use program to automatically calculate the wire size, fuses, crossover capacitors and other functions when setting up a speaker system. Save hours of time and tedious calculations with this simple

program. Just answer the prompts, type in the information and the answers are immediately presented to you.

Resistor Band Decoder

Do you have trouble remembering the standard resistor colour codes and have fits trying to apply

the multiplier? Well here is a simple utility which makes extensive use of the IBM extended character set and the 16 colours available in EGA/VGA 80 column colour text mode (uses monochrome too) which makes it easy to get any resistor value.

The Resistor Band Decoder is a small useful utility which will give the value in ohms of a standard resistor given the colour of the bands which appear on the resistor. The program is simple enough to use, just start the program and it will prompt you for a two letter code for each band. The codes are available on the screen at all times. A representation of the resistor appears on the screen, and the colour bands will appear as you enter the codes for each band. Once you have entered all four colour bands, the resistor value and tolerance is displayed. A prompt to decode more resistors appears on the screen. The program terminates when you do not want to decode any more resistors.

Listening Room

Listening Room is software designed to minimize the effects of standing waves by determining desirable speaker and listener placement within the audio environment. Sitting in room locations where hot spots or nulls are absent provides a more natural, smoother response, removes the need for excessive equalization and reduces transient decay time.

The Listening Room runs on any IBM compatible machine with DOS 2.11 or better, 256K of RAM and Hercules compatible, CGA colour, EGA colour and VGA colour monitors.

Standing Waves

Due to the nature of home listening environments, low frequency standing wave patterns develop within the room which alter the apparent FREQUENCY RESPONSE and TRANSIENT DECAY TIME of the audio playback system. Standing waves exhibit themselves as pockets of low and high acoustic pressures and may be readily observed by walking around within the listening room while steady state, bass rich material is being reproduced. The response variations, which can exceed 25 db at different listening positions, cannot be properly compensated for by an electronic equalizer.

Of the various solutions to the standing wave problem, adjusting the loud-speaker and listening positions is the least expensive, most practical and often the most effective solution for the average homeowner or apartment dweller. If you are currently considering extreme measures to improve what you believe to be a problem room, use this program first. Many times, no further work will be required.

CW

CW was written to help prospective hams overcome what many perceive to be the biggest obstacle to obtaining an amateur radio license—learning the Morse code. There are numerous programs available in the public domain which send Morse code via a PC's speaker, but most are very limited and are written in BASIC, which requires a clumsy interpreter. CW seeks to provide a comprehensive program which provides several modes of learning and practising the code. The best features of other programs are included and many new features have been added to those previously available.

Hampac

Hampac is a wonderful program for anyone who is concerned for amateur radio, especially someone who is studying for their government test. It is an interactive program that asks questions and lets you answer. It also grades you on your answers. The program includes a novice theory test, a technical test, an advanced test, morse code practice, a simple calculator and a module to let you calculate four different types of antennas.

HOWTOFAX

Receiving Weather Satellite Imagery: A Beginner's Primer

Dedicated to satellite tracking, decoding of NOAA/Soviet meteorological satellite telemetry, and Digital Image Processing of satellite pictures.

How to Receive APT Pictures From the NOAA Satellites

So you have decided you want to receive the NOAA and Russian METEOR orbiters and you have a radio that receives 137.500 MHz and a computer. So now what do you do? This short dissertation will steer you in the correct direction.

Cordless

Ever wondered how to listen to cordless phone conversations. What frequencies are they on? Well here's the frequencies for the new cordless phones. You can set the channels up on most scanners so you can listen in on the neighbourhood gossip, etc.

You should be able to hear both sides of the conversation on either the base or handset frequencies due to the telephone hybrid circuitry.

Yagi

YAGI-UDA helps work out YAGI antenna calculations. Just run it... it explains itself.

BDS

BDS is an engineering calculator that pops up from within any application. Just run it to load it into memory and hit Alt plus the tab key to make it appear.

BDS will calculate distance & azimuth, coordinates, depression angle, wavelength, FM blanketing contour, distance to radio horizon and inductance and capacitance. It will also function as a metric converter—a handy piece of software to have around.

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Einstein and the Great Household Refrigerator

by George Colpitts

In November 1936, a *New York Times* headline announced "Einstein Inventor of Camera Device," the reporter surprised that the man of "abstruse sciences," who reigned in a cosmos of high-level mathematics and theoretical physics had been caught — well — tinkering with technology.

The report certainly went against popular perceptions of Einstein. Newspaper coverage, which the scientist found irksome, generally implied that guru-like wisdom emanated from the him perpetually. Both North American and European society looked to him for answers to global questions and philosophic dilemmas, especially with the late '30s rise of European Nazism.

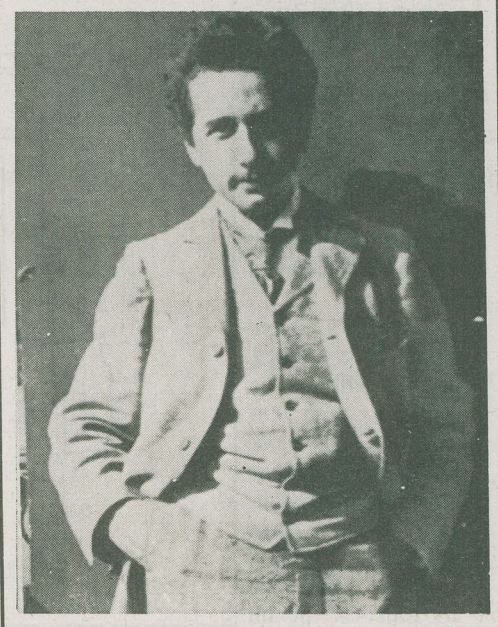
And this was the next revelation? Not the grand unifying theory, but a new camera device?

Actually, it was an auto-exposure camera, with a photoelectric cell which sensed light intensities. When too much light was entering the camera, a screen of varying thickness dropped over the lens. Nonetheless, the camera's awkward mechanics were disappointing: a "simple gadget" as the *Times* called it, "all the amateur need do is to press the button, secure in the knowledge that the screen will let in the proper light."

Whether true or not, the newspaper stressed that the camera's creators, Einstein, and his close friend Dr. Gus-

tav Bucky — himself a leader in X-ray technology — were a little embarrassed at being caught tinkering with rude machinery and household electricity.

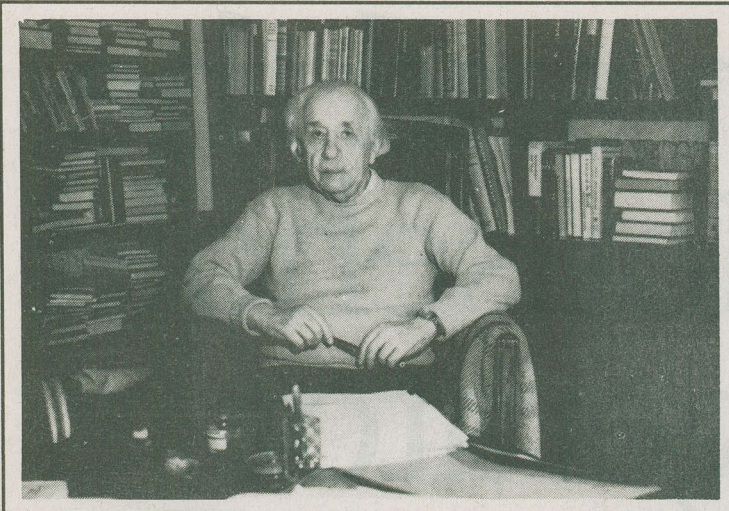
But with Einstein one couldn't really separate the theorist from the tinkerer, whose adroit creativity saw him balancing cutlery at dinner tables or speculating on how solar energy could be captured. If anything, the camera's design reflected more clearly the far-reaching scope of a mind which thrived on men-



A young Albert Einstein photographed prior to joining the Bern Patent Office. He began planning his voltmeters shortly afterward.

tal — and mechanical — innovation. "Every great advance in science has issued from a new audacity of the imagination," he said at one point. Like his revolutionary physics, Einstein's inventions had a spirit of great audacity but were virtually unknown to his public. As Bucky had said when questioned about the new camera: "A man must have some private corner in his life." Einstein's private corner, hazy with pipe smoke, was cluttered with designs for new refrigerators, hearing aids, and linear action motors.

Roots to Einstein's inventive spirit may be traceable to his upbringing. Late 19th-century excitement for electricity had prompted his father Hermann and uncle Jakob to design and manufacture electrical products. Some of Einstein's adolescence was spent in their world of fascinating invention, if not revealed in the Einstein's workshop or at the kitchen table where his uncle most likely unrolled blueprints, then certainly at the German exhibitions where the Einsteins promoted their products which ranged from arc lights and circuit breakers to dynamos. Moreover, from 1889 to 1890, the Einsteins and a collaborator, Sebastian Kornprobst, developed an electrical "clock meter" which measured ampere-hours as well as watt-hours. Unlike contemporary electrical meters — remember that metering electricity use was one of the biggest problems facing the new in-



Einstein in his Princeton study where he did some work on his refrigerator.

dusty — the Einstein-Kornprobst patent measured either direct or alternating current and used, centrally in its design, two clocks: one keeping regular time and another keeping time relative to the amount of current used. Some writers — perhaps stretching the analogy — have asserted this meter, comparing clocks in different frames of reference, possibly influenced Einstein's interest in relativity.

For Albert Einstein, the idea of measurement appeared later in a 1907-1910 collaboration with the Habicht brothers, Johann Conrad and Franz Paul, to develop a highly sensitive voltage meter. Einstein had become interested in voltage fluctuations in condensers and whether he could prove his theories of Brownian motion with an instrument to measure potential differences to 5×10^{-4} volts. The meter he devised used multiplying techniques in a series of condensers of varying capacities, an electrostatic method which he thought might also be valuable in studies of radioactivity. He called the system, affectionately, his "Maschinchen" or little machine.

Einstein's affiliation with the Habicht brothers went back a number of years to when he was working at the Bern patent office, when some of his most important papers on relativity were written. In 1905, for instance, he had written to Conrad urging him to join "the patent slaves", and hinted at his capacity for hard work: "Bear in mind that beside the eight hours work

each day there are eight hours for mischief, and besides there is Sunday." It is clear that Einstein dedicated much time to his little machine when he and the Habichts began work a number of years later. In a letter he wrote that "I am very curious how much can be achieved [with the machine] — I have rather high hopes. I have dropped the patent, mainly because of the lack of interest of the manufacturer...." Later, he found a "clever mechanic" who attempted to build it and later still, in 1910, a working model with a set of six rotating condensers was demonstrated by the Habichts in Berlin. To Einstein, tinkering was a source of great pleasure. He wrote Conrad after Paul's death in 1948, "The memory awakens of old days in which I worked with your brother on the ... little machine.... It was wonderful, even though nothing useful came of it."

Einstein's inventions were created, almost without exception, with his friends and close colleagues. One can imagine them visiting amidst pipe smoke (until Einstein was forced to quit for health reasons; then he relinquished his tobacco pouch to their custody, with

each day there are eight hours for mischief, and besides there is Sunday."

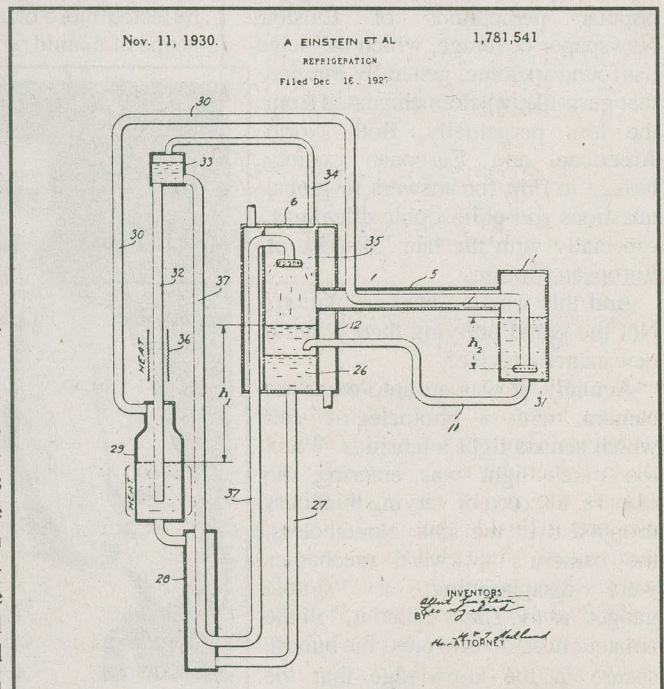
It is clear that Einstein dedicated much time to his little machine when he and the Habichts began work

the proviso that they let him sniff it occasionally), sharing ideas, and sometimes constructing imaginary devices in the room's smoky air. Gustav Bucky, who moved to the U.S. about the same time Einstein had, spent many hours with Einstein in such camaraderie. They not only struck upon the camera idea, but speculated on using gravitation to measure altitude and creating a "proportion description of sound waves by magnetic means," as Einstein writes in one letter to Bucky.

Perhaps Einstein's most intriguing patents were developed with fellow-physicist and friend Leo Szilard, who, over a five-year period, worked with him to develop a new household refrigerator.

In 1929, hints of the device appeared in a *Times* story announcing that Einstein had constructed "a miniature refrigerator capable of producing artificial ice or cold air for domestic use." The story reported, erroneously, that the refrigerator used a "current of light" to achieve refrigeration. Actually, the Einstein-Szilard pump, a central feature of the refrigerator, was much more complicated.

"By means of an alternating electric current," Einstein explained, "a mag-



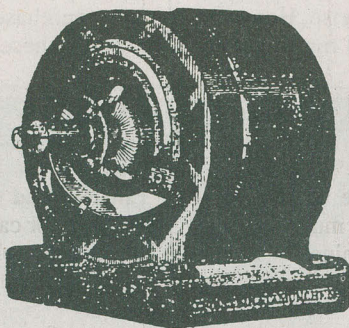
The 1930 Patent for the Einstein/Szilard refrigerator. Intrinsic to the pump's design is a capability to transform waste heat into useable heat.

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elektrischer
Beleuchtungs-
anlagen
in jedem Um-
fange.



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anlagen
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Bogenlampen, Elektrizitätszählern,
Mess- und Regulirapparaten.

The 1891 advertisement J. Einstein & Co. ran in a number of German Electrical Publications.

netic guide field is generated which moves a liquid mixture of sodium and potassium. This mixture moves in alternating directions inside a casing and acts as the piston of a pump; the refrigerator [inside the casing] is thus mechanically liquified and cold is generated by its re-evaporation."

Although the refrigerator's design was in many ways successful and models were sold, Einstein noted that "such refrigerators were never commercially utilized because of the rapid advances made in mechanical refrigerators which eliminated their ob-

jectionable noise, the dangers from leakage of the poisonous refrigerant, and erratic operation[?!]"

The heat pump, however, has a number of redeeming features, most of which are only now being adapted for modern use. Underlying the system is its ability to transform waste heat into usable heat, appealing now in a society more interested in energy conservation. Einstein and Szilard spent many years improving their refrigerator's electromagnetically driven liquid-metal pump, which now has application in sodium-cooled nuclear reactors and

solar towers. Most interesting is the system's electromagnetic motor that produces linear oscillatory motions instead of rotary motions, again, a feature with growing application in modern transportation systems such as Europe's high-speed rail development.

The time and energy spent on the refrigerator was impressive and Einstein most likely took a personal interest in its progress. Walter Gerlach wrote that he had met Einstein on one occasion just after the great scientist had learned one of the refrigerator's earlier designs had been rejected by the patent office. The idea Szilard and Einstein wished to patent, apparently, had already been known to exist. Gerlach said that Einstein was quite dejected and said, "If this would have happened to the theory of Special Relativity[!]"

Other flights of imagination were grounded in audio work with Einstein's friend, Rudolf Goldschmidt. Goldschmidt, a former Westinghouse engineer, had returned to Germany to be a university professor and inventor of high-frequency apparatus used in trans-Atlantic wireless technology. In the 1920s, Einstein had collaborated with the engineer on a resonator later used in one of Goldschmidt's inventions, demonstrated in 1927 as a "Pulse Reader," which attached to a patient's wrist with a cuff and read heart beats.

In 1928, Einstein wrote Goldschmidt to ask him to help him develop a hearing aid for a friend, a singer, who had become hard of hearing. Their final patent was entitled: "Device, especially for sound-reproduction equipment, in which changes of an electric current generate movements of a magnetized body by means of magnetostriction", and was issued January 10, 1934.

Einstein's original letter to Goldschmidt asking him for help is worthy to note. It contains a telling glimpse of Einstein's creative muse in

see Einstein, page 46

Flea Markets

by Bob Havens, VE3IYO (VE3MPS)

Flea markets are a lot like fall fairs and exhibitions. I am not a loyal follower but I thoroughly enjoy going to one or two a year. They can be educational, entertaining and absorbing. With all the crazy worries we have in our everyday lives that in itself is worth the adventure in time.

The market in Kitchener-Waterloo this June held a special interest for me. We left Mitchell as a two-car convoy and four of the travellers were newly licensed ham operators. I was personally shopping for my daughter who had just received her call in the mail — VE3XRD — and while she was away at a friend's cottage partaking of the early summer weather rush I had a promise to fulfil. When she was ten (3 years back), there was talk of changing the Canadian regulations to allow easier access to the hamming bands. This finally took hold last fall and after 5 months of study she wrote and passed her exam. My promise to buy her that first (I have never met a ham who owned only one radio for long!) transceiver had to be met soon.

Now there are definitely two philosophies about the theory of flea market bargains. As with yard sales there are definitely more and numerous bargains for the early to rise. However, if you have tastes which run to the ec-

11:30. Plenty of time left to complete weekend plans.

One side-benefit of becoming a ham is the personalized license plates you can purchase. Unlike catchy cute phrases these serve a fairly practical



Crush of Interested Hams at Flea Market

Timing is Everything

The early operator gets the cabinet. While talking with different amateurs in our area to see if we could share travelling arrangements I spoke with Bob (VE3HJP) and he was leaving Mitchell around 7 so he arrived just as they opened. He knew there would be empty cabinets for those who like building their own power supplies or other radio projects. He also knew that most of them would be gone within the first hour after the day began.

centric or unusual, coming later may have its reward. That bargain could be reduced even further as the vendor begins to re-evaluate his asking price.

Our Arrival

We were neither very early nor very late. The second car with new hams VE3MPW and VE3NTG were headed to the trailer from here. We pulled in about 9:30 AM. The market was closing around noon and we didn't think more than an hour or two was necessary for us to find what we wanted. That was fairly accurate since we left close to

purpose. My plate and call VE3IYO was just purchased two years ago. There are a few good reasons for displaying your call as you drive along.

1. Recognition. Other hams will definitely know you are part of the fraternity and make you welcomed wherever you go. Our family has had hot coffee served and canoe shuttle service provided from a ham we met in just this fashion.

2. Safety. If you display your call you are welcoming those who know what it

See Flea Markets, page 45

Babani Books

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This book is primarily intended as a follow-up to BP239, and also should be of value to anyone who already understands the basics of voltage testing and simple component testing.

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This book provides background information on high power audio amplifiers, together with some practical designs capable of output powers of up to 300 to 400 watts r.m.s.

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BP282: UNDERSTANDING PC SPECIFICATIONS \$15.80

If you require a microcomputer for business applications, or a high quality home computer, an IBM PC or compatible is often the obvious choice. They are competitively priced, and are backed up by an enormous range of applications programs, hardware add-ons, etc. The main difficulty for the uninitiated is deciding on the specification that will best suit a person's needs. This book explains PC specifications in detail, and the subjects covered include: types of PCs, math co-processors, memory, display adaptors and more.

BP285: A BEGINNERS GUIDE TO MODERN ELECTRONIC COMPONENTS \$15.80

It is easy for beginners and advanced users alike to become confused by the wide range of components currently available. In this book, the basic functions of the components are described. The main thrust of the book is concerned with practical aspects such as colour codes, deciphering code numbers and the suitability of components for given applications. Essential reading for all electronic enthusiasts, this book presents a vast amount of invaluable information to enable you to select the right components every time.

BP290: AN INTRODUCTION TO AMATEUR COMMUNICATION SATELLITES \$15.80

Communications and broadcast satellites are normally inaccessible to individuals. There are a large number of amateur communications satellites in orbit around the world, and they can be tracked and their signals received with relatively inexpensive

equipment. This equipment can be connected to a home computer such as the IBM compatible, for the decoding of received signals. This book describes several currently available systems, their connection to an appropriate computer and how they can be operated with suitable software.

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The loudspeaker system is a critical part of any public address installation. All too often it is woefully inadequate, resulting in poor intelligibility and unnatural reproduction. We here examine the various systems and their drawbacks, and describe LISCA, the Line-Source Ceiling Array. This gives astonishing clarity, even coverage, reducing feedback, natural source location and even a pseudo-stereo effect. It promises to be the ultimate system for small to medium sized halls. Full step-by-step construction and installation details are given.

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Radio wave propagation, one of the more important discoveries made in the early 20th century, has its origins in the world of solar physics. The sun's radiation provides the mechanism for the formation of the ionosphere. How the ionosphere is formed, and how it provides long-distance communication, is carefully explained. Non-ionic propagation, including "moonbounce" or satellite communications, is covered as well.

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F.G. Rayer, T. Eng. (CEI), Assoc.IERE. This book contains both simple and more advanced projects for the reader developing a knowledge of the workings of digital circuits. To help the newcomer to the hobby the author has included a number of board layouts and wiring diagrams.

BP72: A MICROPROCESSOR PRIMER \$5.25

In an attempt to give painless approach to computing, this inexpensive book will start by designing a simple computer and then the short-comings of this simple machine will be discussed and the reader is shown how these can be overcome.

BP74: ELECTRONIC MUSIC PROJECTS \$10.00

R.A. Penfold. Although one of the more recent branches of amateur electronics, electronic music has now become extremely popular. The purpose of this book is to provide the constructor with a number of practical circuits for the less complex items of electronic music equipment, including such things as a Fuzz Box, Waa-Waa Pedal, Sustain Unit, Reverberation and Phaser Units, Tremolo Generator, etc.

BP85: INTERNATIONAL TRANSISTOR EQUIVALENTS GUIDE \$9.00
Designed to help the user find possible substitutes for a popular user-oriented selection of modern transistors and includes devices produced by over 100 manufacturers.

BP92: ELECTRONICS SIMPLIFIED - CRYSTAL SET CONSTRUCTION \$5.25
This is a book written especially for those who wish to participate in the intricacies of electronics.

BP94: ELECTRONIC PROJECTS FOR CARS AND BOATS \$7.80
R.A. Penfold

Projects, fifteen in all, which use a 12V supply are the basis of this book. Included are projects on Windscreen Wiper Control, Courtesy Light Delay, Battery Monitor, Cassette Power Supply, Lights Timer, Vehicle Immobiliser, Gas and Smoke Alarms.

BP95: MODEL RAILWAY PROJECTS \$7.80
Electronic projects for model railways are fairly recent and have made possible an amazing degree of realism. The projects covered included controllers, signals and sound effects: stripboard layouts are provided for each project.

BP98: POPULAR ELECTRONIC CIRCUITS, BOOK 2 \$9.00
R.A. Penfold

70 plus circuits based on modern components.

BP101: HOW TO IDENTIFY UNMARKED IC's \$1.95

An unusual and fascinating chart that is highly recommended to all those interested in electronics and which will hopefully pay for itself many times over, by enabling the reader to use IC's that might otherwise have been scrapped.

BP103: MULTI-CIRCUIT BOARD PROJECTS by R.A. Penfold \$7.80

This book allows the reader to build 21 fairly simple electronic projects, all of which may be constructed on the same printed circuit board. Wherever possible, the same components have been used in each design so that with a relatively small number of components and hence low cost, it is possible to make any one of the projects or by re-using the components and P.C.B. all of the projects.

BP106: MODERN OP-AMP PROJECTS by R.A. Penfold \$7.80

Features a wide range of constructional projects which make use of op-amps including low-noise, low distortion, ultra-high input impedance, high slew-rate and high output current types.

BP110: HOW TO GET YOUR ELECTRONIC PROJECTS WORKING \$7.80

R.A. Penfold
We have all built circuits from magazines and books only to find that they did not work correctly, or at all, when first switched on. This book will help the reader overcome these problems by indicating how and where to start looking for many of the common faults that can occur when building up projects.

BP111: AUDIO \$14.00
Covers a wide range of material from analysis of the sound wave, mechanism of hearing, acoustics, microphones and loudspeakers, amplifiers, and magnetic disc recording.

BP115: THE PRE-COMPUTER BOOK \$5.85
Aimed at the absolute beginner with no knowledge of computing, this entirely non-technical discussion of computer bits and pieces and programming is written mainly for those who do not possess a microcomputer but intend to one day own one.

BP118: PRACTICAL ELECTRONIC BUILDING BLOCKS - BOOK 2 \$7.60
R.A. Penfold

This sequel to BP117 is written to help the reader create and experiment with his own circuits by combining standard type circuit building blocks. Circuits concerned with generating signals were covered in Book 1, this one deals with processing signals.

BP121: HOW TO DESIGN AND MAKE YOUR OWN PCBs \$5.85

The purpose of this book is to familiarize the reader with both simple and more sophisticated methods of producing printed circuit boards. The book emphasizes the practical aspects of printed circuit board designs and construction.

BP122: AUDIO AMPLIFIER CONSTRUCTION \$6.75

A wide circuits is given, from low noise microphone and tape head preamps to a 100W MOSFET type. There is also the circuit for 12V bridge amp giving 18W. Circuit board or stripboard layout are included. Most of the circuits are well within the capabilities of even those with limited experience.

BP125: 25 SIMPLE AMATEUR BAND AERIALS \$5.85

This book describes how to build 25 amateur band aerials. The designs start with the simple dipole and proceed to beam, triangle and even a mini-rhombic.

BP127: HOW TO DESIGN ELECTRONIC PROJECTS \$9.00

Although information on stand circuits blocks is available, there is less information on combining these circuit parts together. Practical examples are used and each is analyzed to show what each does and how to apply this to other designs.

BP130: MICRO INTERFACING CIRCUITS BOOK 1 \$9.00

Aimed at those who have some previous knowledge of electronics, but not necessarily an extensive one, the basis of the book is to help the individual understand the principles of interfacing circuits to microprocessor equipment.

BP131: MICRO INTERFACING CIRCUITS - BOOK 2 \$9.00

Intended to carry on from Book 1, this book deals with practical applications beyond the parallel and serial interface. Real world interfacing such as sound and speech generators, temperature, optical sensors, and motor controls are discussed using practical circuit descriptions.

BP136: SIMPLE INDOOR AND WINDOW AERIALS \$7.00

People living in apartments who would like to improve shortwave listening can benefit from this book on optimizing the indoor aerial.

BP155: INTERNATIONAL RADIO STATIONS GUIDE \$9.00

An invaluable aid in helping all those who have a radio receiver to obtain the maximum entertainment value and enjoyment from their sets.

BP174: MORE ADVANCED ELECTRONIC MUSIC PROJECTS \$12.00

Complementing Book PB74, Electronic Music Projects,

BP174 provides projects, such as a flanger, a phaser, mini-chorus and ring modulators, percussion synths, etc. Each project has an Introduction circuit diagram and constructional notes.

BP179: ELECTRONIC CIRCUITS FOR THE COMPUTER CONTROL OF ROBOTS \$12.00

The main stumbling block for most would-be robot builders is the electronics to interface the computer to the motors, and the sensors which provide feedback from the robot to the computer. The purpose of this book is to explain and provide some relatively simple electronic circuits which bridge the gap.

BP180: ELECTRONIC CIRCUITS FOR THE COMPUTER CONTROL OF MODEL RAILWAYS \$9.00

Shows how home computers can easily be applied to the control of model railroads and other quite sophisticated control. A variety of projects are discussed as well as circuits for train position sensing, signal and electric points control, etc.

BP185: ELECTRONIC SYNTHESIZER CONSTRUCTION \$9.00

With this book a relative beginner should be able to build, with a minimum of difficulty and at a reasonably low cost, a worthwhile monophonic syn-

thesizer and also learn a great deal about electronic music synthesis in the process.

BP192: MORE ADVANCED POWER SUPPLY PROJECTS \$8.00

Robert Penfold.

A companion to BP76, this book covers switched mode supplies, precision regulators, tracking regulators, computer-controlled supplies, etc.

BP225: A PRACTICAL INTRODUCTION TO DIGITAL ICs \$7.00

This book deals mainly with TTL type chips such as the 7400 series. Simple projects and a complete practical construction of a Logic Test Circuit Set are included as well as details for a more complicated Digital Counter Timer project.

BP233: ELECTRONIC HOBBYIST HANDBOOK \$15.00

A single source of easily located information: colour codes, pinouts, basic circuits, symbols, etc.

BP239: GETTING THE MOST FROM YOUR MULTIMETER \$9.00

This book is aimed at beginners in electronics. Using the simple component and circuit testing techniques in this book the reader should be able to confidently tackle servicing of most electronic projects.

BP240: REMOTE CONTROL HANDBOOK \$12.00

Includes remote control systems, transmission links, digital electronics, methods of control, decoders, etc.

BP245: DIGITAL AUDIO PROJECTS \$11.80

This book takes a look at the basic principles involved in converting an audio signal into digital form and then converting it back to an analogue signal again. It also contains practical circuits for constructors to build and experiment with.

BP247: MORE ADVANCED MIDI PROJECTS \$11.80

This book includes circuits for a MIDI indicator, THRU box, merge unit, code generator, pedal, programmer, channeliser and analyzer.

BP248: TEST EQUIPMENT CONSTRUCTION \$11.80

This book describes in detail how to construct some simple and inexpensive, but extremely useful, pieces of test equipment.

BP249: MORE ADVANCED TEST EQUIPMENT CONSTRUCTION \$14.00

This book carries on from BP 248, TEST EQUIPMENT CONSTRUCTION, describing some slightly more advanced projects for readers who have a certain amount of experience at project construction.

BP251: COMPUTER HOBBYISTS HANDBOOK \$23.80

This book provides a range of useful reference material in a single source so that it can be quickly and easily located. The subjects covered include microprocessors and their register sets; interfacing serial, parallel, monitor, games and Midi ports; numbering systems; Midi codes; operating systems and computer graphics.

BP256: AN INTRODUCTION TO LOUDSPEAKERS AND ENCLOSURE DESIGN \$11.80

This book explores many types of enclosures and drive units. Crossover units are also explained, the various types, how they work, the distortions they produce and how to avoid them.

BP257: AN INTRODUCTION TO AMATEUR RADIO \$14.00

Topics covered in this book include the basic aspects of the hobby, such as operating procedures, jargon and setting up a station. Technical topics include propagation, receivers, transmitters and aerials etc.

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Tech-niques, cont'd from page 29

strumentation where analog signals are often sent over relatively long distances and from various pieces of equipment which may have differing ground potentials. Electrically isolating the two pieces of equipment could avoid ground loop problems.

Figure 1 shows a circuit set up to be used in the first application, where the input is the 5 volt output of a switching power supply. The 5 volts is scaled using the voltage divider consisting of the 20k and 30k resistors, giving an input voltage of 3 volts to the non-inverting input of the LM201 op amp. The output of the op amp drives the input LED of the IL300 through a 100 Ω resistor. Linearization of the signal occurs because the photodiode connected to pins 3 and 4 of the IL300 is connected back to the inverting input of the LM201. The infrared radiation from the LED shines on both photodiodes in the chip. As the output of the LED rises, the current through the feedback photodiode increases dropping more voltage across R3, the 30k resistor connected to the inverting input. This

reduces the differential between the inputs, reducing the op amp output.

But how does this control for non-linearity and temperature, you ask?

If the input voltage increases by 10% there should be an equivalent 10% increase at the output of the optocoupler, and if it increases by a further 10% the output should again increase by 10% to be linear. But if the light-to-current characteristics of the photodiodes in the chip are non-linear (and they are, by nature) the first 10% may yield a 10% change in output while the second 10% yields 12%. But the feedback photodiode will also yield the same response which will reduce the gain of the op amp bringing down the LED current. The same will happen if the output changes because of temperature variations. The gain of the amp will change to compensate.

Choosing values for the resistors in this circuit becomes a bit complex because there are two transfer characteristics (specifications of the chip), called K1 and K2 which indicate how much photodiode current should be expected for a given LED current. Once the LED current is determined, the feedback photodiode current can be found and this can be used to determine

the value for the resistor, R3, which develops the feedback voltage to the amplifier. Application notes which come with the chip show how this should be done as well as how to determine the current limiting resistor, R4, in the output of the op amp. The value of the resistor, R5, used in the output of the IL300 is determined from a chart and depends on the production run of the chip you have. (The overall transfer characteristic of each chip is determined and marked on the chip before it leaves the factory.)

All of this last stuff makes the use of this chip a bit difficult but, on the other hand, if you have an application for it you can probably wade through the math to get what you want. A bit of experimentation should clear up any ambiguity that remains.

Ideally, of course, design of a circuit using a chip like this should be completely done on paper and then a bread-boarded version is used to test it. Those of us who have worked in the practical world of electronics know that some experimentation often is required even after careful design. So give this chip a try. And if you come up with an interesting application for it, let me know...

☐

New!

Colour Clipart

New!

These disks represent the state of the art in computer graphics, digitized full colour images which look like photographs. They can be viewed on any VGA compatible display card and the luminous quality of the images will leave you wondering how civilization existed before the advent of 24-bit colour.

Each collection comes on two quad density disks, for a total of over two megabytes of picture files. Each collection comes with a simple viewing program, but we strongly recommend that you get a copy of Graphic Workshop, available separately on our GIF Users Toolkit, to make the most of your VGA card's high resolution modes and to save you some typing.

PLEASE NOTE THAT SOME OF THE FILES ON THESE DISKS ARE NUDES, AND MAY NOT BE SUITABLE FOR YOUNG OR SENSITIVE USERS.

Vol. 25

SNAP-ON

A woman and a tool box. There's nothing like good chrome plating.

ROSES

I don't know... it *must* have been the roses.

PLASMA

A very strange looking world.

KIKI

Dark eyes, possibly due to excessive makeup.

BLONDE

Unquestionably.

PAULINE

Relaxing, or pretending to.

CHAIR

And its occupant.

HUMMINGBIRD

A bird so real it might well fly off your screen. If it does, rename this file LEAVES.GIF.

MORNING

First thing, before the coffee maker warms up.

GAS EXPLOSION

A very involved fractal.

UMBRELLA

A girl beneath her umbrella.

CROSS ROADS

The intersection of some virtual space, ray traced and surreal.

RACER

A ray traced car. It's amazing what fifteen hours with the right software can do.

(Two quad density disks)

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Vol. 26

REDHEAD

A girl with red hair or red hair dye.

NETSHIRT

A pearl diver, perhaps, or a secretary.

MAGNET

A fractal, mostly in blue.

TRACY

Looks thoughtful. Great literature springs from things like this.

CATHY

After working out.

ON-DECK

Two sunbathers and a yacht.

TENT

In darkest Africa, or perhaps darkest northern Ontario. One tourist trap looks pretty much like another.

LOIS

Does not appear to trust the photographer, perhaps with good reason.

FOREST

Maid of the forest relaxing in a stream.

ODYSSEY

Or at the very least, a bit odd.

ZEBRA GIRL

A long time classic of monochrome clip art come to life in living colour — a girl astride a zebra, sort of.

FANTASY

Some fantasy art for people with particularly rich imaginations.

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Vol. 27

CANDI

Taking it easy after a long day at the office.

TWIST 387

A very strange math co-processor chip, possibly after having been stepped on by a virtual foot.

CLAIRE

Looks rich.

BABE

A girl in a bathing suit.

LUMINOUS

Ray traced spheres. Some things never go out of style.

IMPACT

Earth, asteroid, cheap science fiction flick. Film at eleven.

QUARRY

A long day pounding rocks.

WHITE LACE

Actually, someone wearing white lace. The lace all by itself wouldn't be much of a picture.

BELLA

Looks European.

ILLUMINATED

A young woman standing in really superb lighting.

EBBTIDE

Unusual beach dweller.

WHITE DRESS

One hundred percent cotton. Federal law prohibits the removal of this tag.

(Two quad density disks)

REAL PRICE
\$19.95

Almost *Free* Software

This month we've assembled a number of small, helpful tools to make your PC your obedient servant, as opposed to being a cranky eccentric butler that seems bent on driving you to distraction. This collection includes the canonical assortment of keyboard toggled and flag flippers, several utilities to make copying files easier and a number of essential Windows gadgets and paraphernalia. Oh yes, and there's Fish. You won't want to miss Fish. Every program in this collection has been extensively checked to make sure that it functions as it should and that it contains no viruses or other nasties. Most sources of public domain software do not provide you with this assurance. This collection carries the same promise that all our Almost Free Software does. If you don't feel that it's fair value once you've checked it out, we'll buy it back from you with no gripes or questions. If you have problems with it, our help desk is as near as your phone... just call (416) 445-5600. Please note that this is a two-disk set which will unpack onto four floppies worth of software, about 1.4 megabytes in all. Please specify 5 1/4 or 3 1/2 inch disks... choose the format of your A drive.

\$21.95 (2 Disk Set)

FULLBACK

is a brilliant optimum density file copier. It will copy multiple files to as many floppies as are required to hold them, juggling the order of the files to stuff as much data onto each disk as possible.

FISH

represents one of the few truly essential Windows applications. It's fully configurable, and will make the background of your desktop swim with animated fish of all sorts. You can define the numbers and types of fish you'd like in your aquarium. This package requires Windows 3 and a fairly strange personality to fully appreciate it. Comes with lots of fish.

SWAPKEYS

will come as a great relief to people who can't get used to the weird key placement of 102-key keyboards. It switches the functions of the alt and ctrl keys.

CAPUNLOK

solves the problem of LEAVING YOUR CAPS LOCK KEY ON WHEN YOU DIDN'T MEAN TO. When this little program is loaded, the caps lock will be toggled off every time you hit the shift key.

QWIKTEX

will pop open a window from within any text based application to allow you to send a few lines of text out to your printer. It's the perfect tool for typing quick notes or memos, addressing envelopes and so on. Qwik-

tex assumes your printer is on LPT1.

KEYBOARD FLAGS

consists of six tiny programs to set the state of the caps lock, num lock and scroll lock flags of your keyboard. You can install the appropriate ones in your AUTOEXEC.BAT file to set up your keyboard the way you normally work with it. This is another superb bit of code for owners of 102-key keyboards.

XPATH

speaks to the problem of creating long PATH variables in your environment. Inasmuch as DOS does not allow command lines longer than 128 characters, this is pretty much the limit for a PATH variable too. The XPATH program sneaks by this restriction elegantly.

PIK

is a really clever, intuitive way to select files to copy, move, delete or archive. Simply type DIR and then PIK. It will scan your DIR listing, allowing you to tag the files of your choice.

GANDER

is a Windows 3 file browser with all the trimmings. It saves an enormous amount of popping out to DOS.

SPACE

is a handy Windows 3 gadget which will keep track of the amount of free space on your hard drives. It's particularly handy if you frequently get caught when Windows fills all

your free drive space with temporary files.

RED BURGUNDY

is a small Windows card file which will tell you everything you need to know about red Burgundy wine. Become a wine snob without leaving your desk.

PCCLOCK

displays the time in huge numerals... clever but useless... and it will set your system clock with absolute precision by calling the US naval observatory and checking their atomic clock. Requires a Hayes compatible modem.

GUITAR

is a simple, easy to understand tutor for basic guitar theory. It will help you tune the beast and then walk you through elementary chords.

MOVIE

is a database of several thousand flicks, along with a simple way to search them. It's the ideal tool to help you decide what to watch or what to rent.

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Almost *Free* Software

This month's collection of almost free software begins with the incomparable Duke Nuke'em graphic adventure game. More exciting than a week in an alternate universe, more dangerous than installing DOS 5.0 and more graphic than the files we didn't dare put on our colour clipart disks, this game will keep you up 'til three in the morning. There are also some first class DOS utilities and a handy Windows font checker, among other things. Every program in this collection has been extensively checked to make sure that it functions as it should and that it contains no viruses or other nasties. Most sources of public domain software do not provide you with this assurance. This collection carries the same promise that all our Almost Free Software does. If you don't feel that it's fair value once you've checked it out, we'll buy it back from you with no gripes or questions. If you have problems with it, our help desk is as near as your phone... just call (416) 445-5600. Please note that this is a two disk set which will unpack onto four floppies worth of software, about 1.4 megabytes in all. Please specify 5 1/4" or 3 1/2" disks... but please note that you must order for your A drive.

\$24.95 (2 Disk Set)

DUKE NUKE'EM

is unquestionably among the finest PC computer games ever written, commercial or shareware. It's a huge graphic adventure in which Duke Nuke'em, hero and fine human begin, must face the forces of evil and blast his way through nine levels of seething, scrolling, detonating, stinging, gnawing, zapping, poisonous doom without getting nuked himself. Perhaps the best thing about this game is that when you get to the end, you can order two sequels from the author and keep right on blasting. Requires an EGA or VGA card. If you don't play another game for the rest of the current epoch, you must play this one.

SLIM

is a rather brilliant way to make better use of your hard drive. It allows you to pre-compress files and then have them automatically uncompress when you go to access them. It also works with COM and EXE files, creating applications which are stored compressed by run normally.

EPW

appends a password to any executable file. It prevents anyone who doesn't know the password from running protected programs on your system.

PREVIEW

is a Microsoft Windows application which allows you to preview your fonts. As the number of fonts in most users' sys-

tems grows, this is almost an essential function.

TRISK

is a maddening little puzzle. Requires an EGA or VGA card.

FILM QUIZ

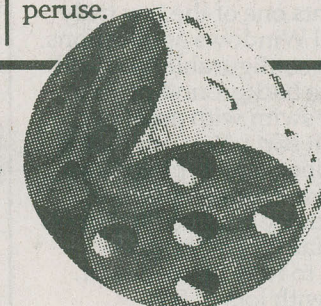
will test your knowledge of esoteric film lore. It consists of a thousand questions about the

flicks, and it's exceedingly difficult to beat.

HERBS

may or may not be useful, but it's exceedingly interesting. It consists of a huge hypertext database of information about herbal medicine and related information. It's fascinating to peruse.

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76



Greg Daub VE3MPW Checks Out Handhelds

Flea Markets, Cont'd from page 35

means to use your radio for emergency or safety information. A few years back someone had suffered a heart attack while at church. Two men left to find help. While one was still trying doors to get to a phone the other had stopped a radio operator who was already contacting the ambulance via a radio phone patch. From tornado spotters to car accidents it can pay to advertise you have a service that can and does save lives.

3. Cost. Although it will cost you the \$100 up front for this personalized plate, you receive a rebate of \$75 which

comes within 3 to 4 weeks of filing. A \$25 lifetime investment — well worth the price and prestige.

We were all amazed at the number of VE3 plates which filled the parking lot. Out of the 200 vehicles, half had the special plates. We hadn't arrived at the door when Mary stopped to chat with us. It is very unusual not to meet several people you know.

Rows and Rows...

Once inside it is much like any other market you have attended. The items are slightly more specialized. Instead of furniture, tools and artwork you see

radios, satellite parts and computer pieces as well as boxes and boxes and rows and rows of tubes, connectors and various radio paraphernalia.

Although pricy, most hams will tell you that one of their most prized possessions is their handheld rig. These radios are tiny and very, very portable. We use them when monitoring parade routes, biking along or walking with them clipped to our belts and of course supervising and directing traffic in and around a flea market. Even with their limited power output and need for external power supply (recharge units or batteries) they can be used in your car and from a home base as well as tag along anywhere else you could go and still need a radio link.

I knew this is what Greg wanted and what my daughter also would like as well. After looking over several used models we decided to buy new equipment. There were three local companies selling new ham equipment and after short discussions about features and price we had what we wanted. Expect to pay between \$300 and \$500 for new equipment, depending on the features and versatility.

While looking over all the different equipment, I met another Mitchell ham who had just finished writing his exam on the previous Friday in London. He was given the results immediately and selected his call. Rick found a very good bargain in an older crystal rig which was his for \$100. He has it in his van now and also operates this same rig from his apartment. Although not as compact as the smaller hand units it provides good mobile coverage and can be easily adapted for home use too.

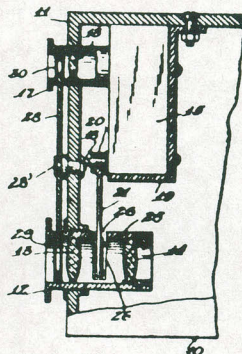
Upcoming Markets...

Although the Kitchener fest is over for another year, you can still attend many markets. Be prepared to pay a small fee which allows you a chance at some fairly good door prizes and helps support the repeaters we all love to use.

Whether you are a short wave enthusiast, curious onlooker, electronic hacker or seasoned ham — take in the flavour of the flea markets — one of them is bound to become as habit forming as our fall fairs and summer garage sales! □

2,058,562
**LIGHT INTENSITY SELF-ADJUSTING
CAMERA**

**Gustav Bucky, New York, N. Y., and Albert
Einstein, Princeton, N. J.**
Application December 11, 1935, Serial No. 53,884
9 Claims. (Cl. 95—10)



1. In combination with a camera having an objective, a shaft, and a photo-electric cell unit including a drive for oscillating said shaft in correspondence with the variation of the light impinging the photo-electric cell, a ring segment shaped screen of a transparency decreasing from one of its ends to the other end, rigidly connected with said shaft and adapted to swing in the path of the light rays passing said objective.

Einstein's and Pucky's Auto-Exposure camera, as it appeared in a 1935 Patent Journal.

Einstein, cont'd. from page 34

the form of a poem (translated from German):

"A bit of technique now and then
Can also amuse thinkers.
Therefore, audaciously I'm thinking far
ahead:
One day we'll produce something good
together."

Einstein found great amusement in his electrical and mechanical inventions. Whether they failed or set in motion modern-day electrical design is really not as important as the mindset they reflect. They certainly don't represent a departure from theoretical physics: Einstein produced, concurrent-

ly with the amusing devices, an impressive life's work in quantum, statistical and philosophical theory. But the patents are significant nonetheless. Between the ages of 45 and 50, Einstein's name appeared more often in patent journals than in scientific publications. The patents' sometimes-crude, sometimes-impressive technology allows a glimpse of Einstein at an unguarded moment. He once said it is more important how a person *thinks*, than what he or she *does*. The patents — artifacts of Einstein's dextrous creativity — reflect a fantastic and diverse thought process, which still defies complete description.

The author would like to thank Steven Baljkas for the great help he provided in the writing of this story. □

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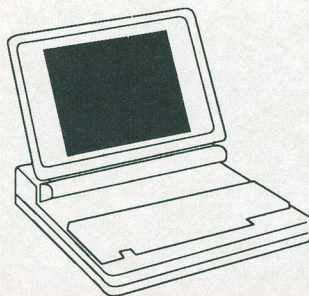
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